

## MDV WATERSHED PLAN ELLSWORTH, WI



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FINAL

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## 1 EXECUTIVE SUMMARY

The WPDES Permit for the Ellsworth wastewater treatment facility (WWTP) proposes a future effluent limit of 0.075 mg/L phosphorus. The existing limit is 1.0 mg/L, the Ellsworth WPDES Permit can be seen in **Appendix 1-1**. The Final Compliance/Facility Plan proposes complying with the permit by implementing Water Quality Trade(s) (WQT) to offset the phosphorus mass from 0.5 mg/L to the 0.20 mg/L limit with a multi-discharger variance (MDV). Ultimately the goal will be to implement more water quality trade (WQT) Projects along with optimizing the WWTP to meet the final WQBEL permit limit of 0.075 mg/l.

In 2018-20, the total discharge from the Ellsworth WWTP Facility averaged 0.337 MGD. The effluent phosphorus concentration averaged 0.48 mg/L. The effluent phosphorus mass loading at 0.5 mg/L and an average yearly discharge of 125 MG is **521 lb./year**. At the same flow, the future 0.075 mg/L limit will reduce the phosphorus mass loading to **78 lb./year**, a reduction of **443 lb./year**, the base trade amount. If the MDV watershed plan is applied, the effluent of 0.20 mg/l would result in a required **discharge** mass load of **no more than** 208 lb./yr. The difference from current discharge to the MDV base load would be 313 lb./yr. This is for current conditions, not the higher flows that are estimated in the future.

The Existing WWTP is located on the east side of the Village of Ellsworth, at the south end of Utility St. The discharge flows to Isabelle Creek, which flows from North to South along the eastern side of the Village of Ellsworth. A site map of the existing WWTP and discharge location can be found in **Appendix 1-2**

## 2 PURPOSE OF WATER QUALITY TRADING PLAN

The purpose of this Water Quality Trading Plan is to describe the how the Ellsworth WWTP will utilize water quality trading (WQT) to comply with the phosphorus limits of WPDES permit WI-0021253-09-0, which will expire on December 31, 2021. This Water Quality Trading Plan will require a Water Quality Trade Agreement between the Village and two (2) property Owners, Matthew Bekkum and Thomas Springett in the Town of Hartland. Both properties are within the Isabelle Creek HUC 12 Watershed, downstream from the Village WWTP discharge. The agreement will be developed pursuant to a Notice of Intent (form 3400-206) to conduct a WQT. The Notice of Intent (NOI), MDV Checklist, and the Presto Watershed Report is included in **Appendix 2-1** of this plan. **The final signed agreements between the Village, Bekkum, and Springett are attached to this report.**

## 3 DESCRIPTION OF EXISTING LAND USES

The project consists of bank stabilization along Isabelle Creek within the Town of Hartland. The existing land was assessed as Agricultural forest and Agricultural. The location of the Project begins at a bridge abutment on 620<sup>th</sup> St and following the stream as it meanders south and west initially, then east. The two (2) private properties that abut the stream are owned by Matthew Bekkum, 8384 Allegheny Grove Victoria, MN, and Thomas Springett, of W5512 US Hwy 10, Ellsworth, WI. The total length of streambank stabilization proposed is 2,975 feet. The two (2) parcels in the proposed streambank stabilization are in a rural setting and are farmland pastured with significant bank erosion.

### 3.1 BANK STABILIZATION ALONG ISABELLE CREEK

Permission was obtained by the property owners to access the streambank and was observed by both staff of Pierce County and Davy Engineering Company. Eight (8) separate segments within these two properties were identified as areas that would benefit from bank stabilization projects. The County staff collected soil samples at each of identified streambank sections and sent the



samples into a lab for soil testing. One soil sample was taken each segment of the streambank. The streambank segments can be seen in **Appendix 3-1**.

#### **4 MANAGEMENT PRACTICES USED TO GENERATE CREDITS**

The project areas include streambank stabilization with some consideration to fish habitat restoration. These areas were chosen by the County because of significant erosion and because of benefits to the property owners, Pierce County residents, as well as generating phosphorus credits for the Village of Ellsworth Wastewater Treatment Facility.

##### **4.1 STREAMBANK STABILIZATION**

The projects are outside of the Village limits, within Hartland Township and are streambank stabilization projects on Isabelle Creek downstream from the WWTF discharge.

The locations within the Isabelle Creek Watershed were chosen to help the community and to gain Phosphorus credits. This area along Isabelle Creek was targeted by Pierce County because of high erosion and recession rates along Isabelle Creek and would generate WQT credits through riprap and erosion improvement projects, see **Appendix 4-1** for photos of each segment.

A very conservative annual recession rate ranging from 0.2 – 0.5 feet per year was determined depending on the severity of each site. It was determined that riprapping the creek banks to permanently armor the banks was the best solution to the erosion problems. Soil samples taken for phosphorus testing were described as alluvial sand, loam as is common with streambanks and stream beds. NRCS maps and classification of the soils were used to determine the amount of phosphorus in pounds per year (lb/yr) at each segment tested.

##### **4.1.1 Duration of Management Practice**

The duration of the management practice can be essentially many years if it is maintained properly. The practice can be constructed after winter thaw but is better to be constructed after the spring rains have subsided, with lower water levels in the creek. The construction will require shaping of the streambank and placement of properly sized rip rap. The landowner(s) will enter into a contract with Pierce County and the Village of Ellsworth, which will require each landowner to maintain the streambank protection. Each agreement may be a little different, depending on the property owner's length of stream bank, distance from the Pierce County Office, and size of the project. Pierce County will be labeled the credit **Broker**, the Village will be identified as the **credit user**, and the property owner(s) will be the credit generator and labeled **Landowner** in the agreement. The operation and maintenance are discussed in more detail in Section 12 of this plan.

##### **4.1.2 Springett and Bekkum Properties**

The Springett and Bekkum properties are two wooded agricultural properties that are adjacent to each other and Isabelle Creek runs through the properties. These properties are both downstream of the Ellsworth WWTP. The bank stabilization required on both of these properties is extensive. The County Land Conservation Department has identified and visited the sites for recession measurements and soil sample collection.

These properties are located in Township 25N, Range 17W, and Section 9 in the NE quadrant. County Road "V" is directly to the north and Isabelle Creek intersects 620<sup>th</sup> St. near both properties approximately 1,270 ft south of the County V and 620<sup>th</sup> intersection. The properties are located approximately four (4) miles south of the Village of Ellsworth. See **Appendix 4-2** for the Soils Map.

## 5 AMOUNT OF CREDIT BEING GENERATED

To determine the number of credits, the NRCS Erosion tool spreadsheet was incorporated along with phosphorus test results from the soil samples. Lateral recession rates described in the NRCS 141 figure 8 were applied for the project location. Recession rates were estimated based on the site visit and older maps of the project location. Updates to the actual rates may occur as more information becomes available. Calculations show that an estimated 517 pounds of phosphorus per year would be prevented from entering Isabelle Creek. See **Appendix 5-1** for the Lateral Recession Rate descriptions and Phosphorus Loss Calculations of each project site.

**Table 5.1 – Lateral Recession Rate & Phosphorus Loss Calculations**

Project Description	BMP Type	P lbs/year
<i>Isabelle Creek – Town of Harland</i>		
Bekkum & Springett (North) 1N	Streambank Stabilization	33
Bekkum (South) 2S	Streambank Stabilization	40
Bekkum (South) 3S	Streambank Stabilization	34.5
Bekkum & Springett (North) 4N	Streambank Stabilization	126
Bekkum (North) 5N	Streambank Stabilization	100.5
Bekkum (South) 6S	Streambank Stabilization	67.5
Bekkum (North) 7N	Streambank Stabilization	64
Bekkum (South) 8S	Streambank Stabilization	52
<b>Total</b>		<b>517</b>

## 6 DESCRIPTION OF APPLICABLE TRADE RATIO PER AGREEMENT/MANAGEMENT PRACTICE

This watershed plan is part of the Multi Discharger Variance (MDV) submittal package. The intent of this watershed plan in conjunction with the MDV is the trade ratios will be on 1:1 during the first permit term (5 years). After the first permit term has expired, the below trade ratios may go into effect, unless the Village re-applies for the MDV due to lack of new WQT Projects or provides other means of compliance with the permit limits. The trade ratio's effective date will be determined by the DNR. During the first permit term, the Village will continue to work with the County to identify additional WQT projects to add to the plan for additional phosphorus credits.

The trade ratios in the following section are preliminary estimates based on WDNR's *Guidance for Implementing Water Quality Trading in WPDES Permits, Edition 2, 6/1/2020*. Trade ratio was determined as outlined below and can be adjusted at each permit term as any of the criteria change. The estimated ratio is derived from the following formula:

Trade Ratio = Delivery + Downstream + Equivalency + Uncertainty – Habitat Adjustment:1

This section of the report will discuss the trade ratio of the different projects. Most of the calculations will be the same for the different projects as all the project sites are in the same HUC 12 and are all downstream of the WWTF. The difference in the calculations will be the uncertainty factor, which varies dependent upon the type of management practice used; therefore, the following discussions will discuss all the projects with similar practices together.

## **6.1 DISCUSSION OF IDENTICAL CHARACTERISTICS FOR ALL PROJECTS**

All of the projects will have the same Delivery Factor, Downstream factor, equivalency factor and in this case the habitat adjustment. The following is a discussion of these factors for all of the projects.

### **6.1.1 Delivery Factor**

The delivery factor is determined by the following equation:

$$\text{Delivery Factor} = (1 / \text{SPARROW delivery fraction}) - 1$$

The delivery factor is now available on the DNR GIS viewer. The credit user and credit generator are in the same HUC 12 basin and the credit generator is downstream of the credit user. The distance between the two is approximately 3.85 miles apart, or 6.38 miles if the meandering path of the creek from the credit generator project site to the credit user discharge point in Isabelle Creek is measured. Per the *Guidance for Implementing Water Quality Trading in WPDES Permits 2020*, the Delivery Factor in section 3.4 states “The delivery factor accounts for the distance between trading partners and the impact that this distance has on the fate and transport of the traded pollutant in surface waters” (pg. 26). The delivery factor is often zero when in the same HUC 12. See **Appendix 6-1** for the HUC 12 Watershed Basin Map. The delivery factor is based on the difference between both the fraction in the creditor’s and user’s sub-basin. Both fractions are identical for all projects, which result in the delivery factor equaling zero, as anticipated.

### **6.1.2 Downstream Factor**

The credit generator (Project Site) is downstream of the credit user (WWTF); therefore, the downstream factor must be determined from the point source to nonpoint source contribution as determined by WDNR Pollutant Load Ratio Estimation Tool (PRESTO). The credit generator and credit user are in the same HUC 12 watershed. Because the Credit User’s load is less than 25% (per PRESTO 15%), the downstream factor is 0.1.

### **6.1.3 Equivalency Factor**

The WQT for the credit user is based upon total phosphorus (TP). According to the *Guidance for Implementing Water Quality Trading in WPDES Permits* from the Wisconsin Department of Natural Resources (2020), when accounting for the equivalency factor for TP, the equivalency factor is zero. This is because the differences between the soluble and sediment-bound P have been accounted for in the delivery factor (pg. 28). The equivalency factor is zero (0).

### **6.1.4 Habitat Adjustment**

The habitat adjustment factor is the factor given for implementing fishery habitat within a stream. The County has identified one or two possible locations for habitat adjustments within the project areas. Pierce County is working with Kasey Yallaly with WDNR to get some habitat ideas. “Rootwads” or Weir/Plunge pools are some ideas that the County has suggested to WDNR. At the writing of this report, WDNR was planning to make a site visit to determine which habitat structures would be viable. **A combination of (9) root wads, (4) rock v-weirs, and (5) boulder clusters will be installed as part of the project.** Once the locations and habitat structures are known, the Village will use these improvements to reduce the overall trade ratio for the applicable sections of the Project. Sections will be identified on the construction plans of the streambank projects that are planning to install fishery habitat improvements, which will reduce the uncertainty trade factor from 3:1 to 2:1. This will directly



affect the final Water Quality Trade Project, and NOT the MDV Project. Adjustments to this factor could be made at the end of each permit term. Surface Water Data Viewer lists this segment of Isabelle Creek as a Class 3 trout stream. Habitat improvements will provide an ecological benefit to the entire stream. Isabelle Creek does become a Class 2 trout stream designation not too far downstream from the proposed improvements.

#### **6.1.5 Uncertainty Factor**

The uncertainty factor is used to compensate for the uncertainty of the effectiveness of the WQT project/plan. The uncertainty, especially with non-point discharges, is because many factors which are not controllable determine the effectiveness of the implementation, such as climate, potential inaccuracies from field testing or the reliability of the management practice to perform under various hydrological conditions. The WDNR has established a table to help assign values to the uncertainty variable of the equation. The table can be seen in Appendix H, on pages 148-152 in the *Guidance for Implementing Water Quality Trading in WPDES Permits* (Wisconsin Department of Natural Resources, 2020). For streambank stabilization and shoreline protection, WDNR has assigned a value of three (3). With aquatic habitat adjustment, that ratio can be reduced to two (2); If WDNR and the County do decide to implement an aquatic habitat improvement, then the uncertainty value of two (2), will be applied as part of the future overall water quality trade project.

#### **6.1.6 Bank Stabilization Project Sites**

The bank stabilization projects include project **designated** numbers 1N,2S,3S,4N, 5N,6S,7N, and 8S from the table in section 4. All the projects are on Isabelle Creek along two private properties as noted above. These locations are all downstream of the WWTF. See Appendix 4-2 for a location.

#### **6.1.6 Summary**

In summary, the delivery factor was determined to be a zero (0) due to the proximity of the water quality trading to the discharge point of the credit user. The downstream factor was also determined to be zero point 1 (0.1), because the credit generator is downstream of the credit user and the credit user load was less than 25% based on the PRESTO tool, and both are within the same HUC 12 watershed. The equivalency factor is zero (0), because the differences between the soluble and sediment-bound P have been accounted for in the delivery factor. The uncertainty factor was determined to be a three (3) based upon Appendix H of the *Guidance for Implementing Water Quality Trading in WPDES Permits*, without any Aquatic Habitat improvement. If the habitat adjustment is approved, then the overall ratio will drop to two (2). Based upon the discussed factors, the trade ratio equation with the values substituted becomes the following:

Trade Ratio<sub>1</sub> =  $0 + 0.1 + 0 + 3 - 0 = 3.1:1$  (without Aquatic Habitat Improvement)

Trade Ratio<sub>2</sub> =  $0 + 0.1 + 0 + 3 - 1 = 2.1:1$  (with Aquatic Habitat Improvement) **Habitat structures will be installed as part of the approved project.**

A trade ratio has a minimum value per the *Guidance for Implementing Water Quality Trading in WPDES Permits* to be 1.2 (p. 31). Therefore, the trade ratio for this project site is as follows:

Trade Ratio = 2.1:1

Assuming an Aquatic Habitat Improvement is constructed as part of the project. The trade ratio will take effect once the MDV has expired or is NOT renewed.

## 7 **TIMELINES FOR CREDITS AND AGREEMENTS**

The credit generation must occur before the credit user can claim the credit, per *Guidance for Implementing Water Quality Trading in WPDES Permits* (pg. 32). The permit expiration date is December 31, 2021. The Work is planned for summer of 2021; therefore, the available date for the credits will be upon completion and acceptance of the Project, by the end of 2021. Since the stream bank sites will be armored and performing as designed, it will continue to generate credit on an annual basis as long as the riprap is maintained. See **Appendix 7-1** for the Draft Water Quality Trade Agreements for Bekkum and Springett property owners. **Final executed agreements are attached to this updated report (11-2021).**

An anticipated timeline of the milestones can be seen below: (updated dates for final draft in **BOLD**) **Updates in Red as of November 2021.**

<b>Description</b>	<b>Date</b>
Submission of MDV Report to WDNR	March 2021
Final Draft of MDV Report	<b>June 2021</b>
DNR Comments/Approval of Report	<b>May 2021</b>
Execute BMP Agreements	<b>Executed September 2021</b>
Design and Chapter 30 submittal	June 2021
Solicit Contractors for project work	<b>Bid opening September 16, 2021</b>
Contractor to install project work	<b>Work began September 27, 2021</b>
Completion of construction	<b>Due to spawn restrictions, work to continue Into 2022. Projected completion date</b>
	July 2022

## 8 **METHOD FOR QUANTIFYING CREDITS**

### **8.1 BANK STABILIZATION**

Existing phosphorus loss (PL) for this streambank project was produced using the equation of  $PL = (L)(H)(R)(Pc)$ , which can be seen in **Appendix 5-1**. The County produced data for the streambank in linear feet (L), the average stream bank height in feet (H), and the total soil phosphorus concentration in units of % P (Pc) (see **Appendix 8-1** soil test data from the University of Wisconsin Soil Science Laboratory for each streambank segment used to determine the phosphorus loss in pounds per year. Soil samples were taken by Pierce County Department of Land Conservation staff. The methodology used to gather the soil samples involved a minimum of 10 probe pulls per soil sample, with each probe being at a varied height along the bank. This included the encompassing samples to be from the ordinary high-water mark (OHWM) to the water level and all along the streambank site. The minimum of 10 pulls were put in a bucket, mixed, and put in a soil sample bag prior to being given to the lab. The average % P over the samples gathered can be seen in **Appendix 8-1**. Thus, it was deemed that these projects would withhold at least **517** pounds of phosphorus from entering Isabelle Creek due to the bank stabilization projects each year that the riprap would be retained.

## 9 **TRACKING PROCEDURES**

These projects will be tracked with photography before, during, and after project installations. The projects will also be monitored with inspections and documented in a logbook to ensure the preservation of the project sites and BMP installations. The landowners or County will continually inspect the sites after flood events and will certify the annual inspection reports. The annual inspection reports will be submitted to the Pierce County Department of Land Conservation for approval. The annual inspection

report will document that the BMPs are stable, and phosphorus was prevented from entering the water each year. The County will randomly field check at minimum 20% of the annual reports each year to hold the landowners accountable and verify the submitted reports. An annual report will be completed and submitted to DNR documenting the inspections. The following items will be inspected by the landowner or County during the annual inspection:

1. Inspect for trash and unwanted debris;
2. Inspect for soil erosion and accumulation, especially at the top and bottom of the slope;
3. Inspect for invasive weeds;
4. Inspect for animal burrows, holes, and mounds;
5. Inspect for dislodged or unstable rock which could pose a safety hazard;
6. Inspect site for unusual or unsafe conditions (structural damage, dumping, tree establishment, etc.).

The above inspections will be evaluated in the annual report. The report will discuss the evaluation as well as any action taken. If a more serious action is required, such as requiring a contractor to repair the damage, the report will identify this and the date the contractor repaired the site. The annual report will be submitted to DNR, with a copy to be distributed to the Village of Ellsworth and the Landowner.

## **10 CONDITIONS UNDER WHICH THE MANAGEMENT PRACTICES MAY BE INSPECTED**

### **10.1 BANK STABILIZATION**

The riprap should be inspected at least once per year and immediately after flood events. The velocity of Isabelle Creek and its' tributaries increases greatly during flood events. These portions of the streambank have been eroding at alarming rates during heavy rains. The landowners should work with the Pierce County Department of Land Conservation to ensure that the sites are properly maintained and should approach them for technical assistance if there is a concern regarding the projects.

## **11 REPORTING REQUIREMENTS SHOULD THE MANAGEMENT PRACTICE FAIL**

If the management practice were to fail at any of the sites, the BMP would stop generating credits. The Operation and Maintenance Plan discussed in section 12 should help minimize any potential failures. In the event a failure does occur, the following procedure should be followed to remedy the situation.

1. The perspective landowner should immediately report the situation to the Pierce County Department of Land Management.
2. The County will notify the Village of the BMP failure within 5 days from when the County was informed.
3. The Village will then notify Wisconsin DNR of the BMP failure within 5 days from when the Village was informed.
4. The County will assess the failed BMP.
5. The County will develop a remediation action plan.
6. The Village will be contacted and informed of both the problem and the solution.
7. A cost estimate will be developed during the action plan.
8. The County will coordinate with contractors to make the repairs.
9. The agreement that will be put into place will be followed for the financially responsible party for the repairs, subject to agreement by both parties Landowner/Village. If an agreement cannot be reached the costs of repairs will be shared as described in the agreement for both parties.



## **12 CONSTRUCTION, OPERATION AND MAINTENANCE PLAN FOR EACH MANAGEMENT PRACTICE**

### **12.1 BANK STABILIZATION**

The NRCS standards will need to be followed for construction as well as operation and management of the proposed projects. The bank stabilization projects will follow the NRCS Standard 580, which is streambank and shoreline protection. A copy of the NRCS 580 standard can be seen in **Appendix 12-1**. Perpetual operation & maintenance of the riprap will be the responsibility of the landowner with technical assistance from the Pierce County Department of Land Conservation. The operation & maintenance will consist of the following:

1. Inspect riprap annually and after heavy storms for any erosion or displacement of rocks. Repairs should be done immediately.
2. Debris will be removed to prevent clogging or rerouting of water in the channel. Channel clearing to remove stumps, fallen trees, debris, and sediment bars shall only be performed when they are causing or could cause unacceptable bank erosion, flow restriction, or damage to structures. Habitat forming elements that provide cover, food, pools, and water turbulence shall be retained or replaced to the extent possible.
3. Check for sloughing, erosion, or damage to vegetative cover. Damaged areas shall be graded, shaped, and re-vegetated as soon as possible.
4. Periodically cut grass to control weeds and invading brush.
5. Eliminate burrowing animals and repair damage.

### **12.2 COST ESTIMATES**

Cost estimates were done for each project segment and can be seen in **Appendix 12-2**. The Bekkum and Springett projects combined would be greater than \$25,000, but individual segments could be broken into separate contracts based upon the two properties configuration. If the projects are separate contracts, then most of the work would fall on the Bekkum property. The Springett property might be below the \$25,000 threshold which requires public bid as stated in the Wisconsin Administrative Code 62.15, but because the segments run together it is recommended that the work be bid as one project. **Attached to this report is the Bid Tab that represents construction costs. Final costs will not be known until final quantities and other associated costs can be tabulated when the project is complete in July of 2022.**

## **13 LOCATION OF CREDIT GENERATOR IN PROXIMITY TO RECEIVING WATER AND CREDIT USER**

All of the bank stabilization projects are located south of the Village limits of Ellsworth. All the projects are located downstream of the Ellsworth Wastewater Treatment Facility discharge point and are all within the same HUC-12 (HUC 070400010701), the Trimbelle and Isabelle Creek watershed. See **Appendix 3-1, 1-2, and 6-1** for Location Maps.

## **14 PRACTICE REGISTRATION DOCUMENTS, IF AVAILABLE**

The project has not yet begun, and registration documents will be completed and submitted to the DNR prior to the start of construction. **Attached to this Update are the following documents:**

- Notice of Intent Form 2400-206
- WDNR General Permit Approval Letter
- ACOE Permit
- Executed Trade Agreements for Bekkum and Springett

## 15 HISTORY OF PROJECT SITE(S)

### 15.1 BANK STABILIZATION

The bank stabilization projects include parcels outside the Village limits. All the project sites have not changed in land use in 25 years based upon aerial photography from Google Earth imagery. This is true for both properties, which are owned by the Matthew Bekkum and Theresa Springett Families.

## 16 REQUIRED PHOSPHORUS CREDITS

At the Average Flow of 0.337 MGD, the phosphorus mass loadings and the required WQT are summarized in the following tables:

**Table 16.1 WQT Available Phosphorus Credits to meet WPDES WQBEL limits**

Table 10.1 WQT Available Phosphorus Credits to meet WPDES WQBEL limits			
Scenario: Current Effluent Phosphorus concentrations is ~ 0.5 mg/L. For the following table, no additional treatment is assumed. WQT is analyzed to determine if WQT alone can be used to meet standards (WQBEL-0.075 MG/L). Per table 5.1 – Credits for Project is 517 lb/yr			
Description	Flow	0.337	MGD
	Effluent Phosphorus, mg/L		
	0.5		0.075
Mass of Phosphorus, lbs/year No Improvements, and to meet WQBEL limits in WPDES Permit	512.5		76.9
Required Target for Phosphorus Credits (Baseline – New Standard)	435.6		lbs/year
Available Phosphorus Credit from WQT Projects (Bekkum & Springett)	517		lbs/year
Credits available w/ WQT @ 2.1:1 Trade Ratio (w/ Habitat improvements)	246.2		lbs/year
Credits available for WQT @ 3.1:1 Trade Ratio	166.8		lbs/year
Amount of P credit needed in additional credits with 1:1 TR*	none		lbs/year
Amount of P credit needed in additional credits with 2.1:1 TR*	(189.4)		lbs/year
Amount of P credit needed in additional credits with 3.1:1TR*	(268.8)		lbs/year
*Note: The negative number represents the shortfall in P credits. TR=Trade Ratio			

There are enough Credits through the proposed streambank projects with no trade ratio; however, with at 2.1:1 ratio (w/ aquatic habitat improvements) and 3.1:1 ratio with no habitat improvements, additional credits are needed. Based on the above, the Village needs to apply for the MDV and work with the County to identify future trade projects to make up the difference in future permit terms.

**Table 16.2 MDV WQT Available Phosphorus Credits with Streambank Project Improvements**

Scenario: MDV Watershed plan is accepted and Village WWTP continues to meet 0.5 mg/l or Less phosphorus discharge. With the MDV WQT option, the 0.2 mg/l threshold is the target phosphorus discharge, and the Credits will be used to make up the difference between the actual discharge and threshold value.			
Description	Flow	0.337	MGD
	Effluent Phosphorus, mg/L		
	0.5		0.2
Mass of Phosphorus, lbs/year Discharged by Ellsworth WWTP	512.5		205
Required Target for Phosphorus Credits (Baseline – New Standard)	307.5		lbs/year
Available Phosphorus Credit from WQT Projects (Bekkum & Springett)	517		lbs/year
Amount of P credit needed in additional credits with 1:1 TR* (MDV)	none		lbs/year
At a design flow of 0.485 MGD Amount of credits needed	443		lbs/year
Amount of P credit needed in additional credits with 1:1 TR* (MDV)	none		lbs/year
*Note: At current and design flows with an MDV the proposed project provides enough phosphorus credits to cover the difference between discharge and threshold phosphorus amounts.			

**16.1 SUMMARY**

The estimates show the bank stabilization projects will cost approximately \$282,100 for the all the bank stabilization projects. The cost estimate, as discussed in section 12, is included in **Appendix 12-2**. The project can develop credits for Ellsworth under a number of funding scenarios but not if State funds are used.

**16.1.1 Compare Target Mass to Available Credits at Existing 0.5 mg/L Effluent**

The target phosphorus mass is based upon the effluent concentration and flow of the WWTP. The Village of Ellsworth did a major upgrade to the existing wastewater facility in 2013 which included provisions to remove phosphorus with biological and chemical reduction processes. Currently the Village is able to treat consistently below 0.5 mg/l, which yields a mass of 512 lbs. per year at 0.337 MGD annual average flow. The proposed WQBEL proposed limits in the current permit is a concentration of 0.075 mg/L, which yields a mass of 76.9 lbs. per year at the same volume. To determine the target of phosphorus credit, the new standard mass should be subtracted from the existing mass, which yields a baseline or target mass of 435.6 lbs. per year. This is the target mass for no improvements to the WWTF.

The next step is determining the number of credits generated by the WQT best management practice. In this case, the calculated amount is 517 lbs. per year for the bank stabilization projects. A trade ratio is discussed in Section 6. The weighted trade ratio of all the projects is calculated to be 2.1 with an aquatic habitat improvement OR 3.1 with NO habitat improvement. To implement this ratio, the phosphorus credits generated by the management practice must be adjusted by the trade ratio (517/2.1), which results in 246.2 lbs. per year of available phosphorus credit. Without an aquatic habitat improvement, the credits would be reduced even further to 517/3.1 = 166.8 lb/yr.



The final step is to compare the target mass to the available credit. As determined in the first step, the target mass is 435.6 lbs. per year. The available credit with the trade ratio applied is 246.2 lbs. or 166.8 lbs per year as determined in the second step. The difference between the two values is a negative 189.4 lbs. per year (with habitat improvements) or 268.8 lbs/yr with NO habitat improvement. The 189.4 or 268.8 lbs. per year represent the amount of phosphorus credits which still needs to be obtained after the WQT is implemented with the wastewater discharging an average 0.5 mg/l of phosphorus.

#### **16.1.2 Compare Target Mass to Available Credits at 0.5 mg/L Effluent with an MDV**

Section 16.1.1 discussed the scenario which the WWTP does not provide any additional treatment and what credits are needed to meet the WQBEL WPDES permit criteria shown in Table 16.1. The discussion below follows the criteria needed to meet an MDV threshold limit of 0.2 mg/l shown in Table 16.2.

The Village of Ellsworth did a major plant upgrade that was completed in 2013 with the purpose of expanding capacity and treating for phosphorus by the means of biological reduction in an oxidation ditch system and with the provision of adding chemical for polishing. The prior limits required the Village to treat to less than 1.0 mg/l, and operations staff have been able to consistently meet less than 0.5 mg/l as an average, optimizing the existing system biologically and chemically. The costs to add another unit process such as filter to meet the WQBEL limits of 0.075 mg/l have shown to be significant and would impose social and economic hardship. If Ellsworth continues to discharge less than 0.5 mg/l of phosphorus and explore means of optimizing the existing facility, while under a multi-discharge variance (MDV), the trade ratio of 1:1 would allow the facility to continue to operate while looking for water quality trade projects to eventually meet the WQBEL effluent limits.

The baseline or target mass value will differ from the discussion in Section 16.1.1. The baseline value is dependent upon the effluent concentration of phosphorus. For the proposed limit of 0.075 mg/l, the target value is 435.6 lbs. per year. This target value is based on the ultimate goal, NOT the MDV goal of 0.2 mg/L. The second step is identical to section 16.1.1 since it is based upon the WQT project scope, which yields an available phosphorus credit of 517 lbs. per year when implementing the non-weighted trade ratio.

The final step is to compare the target mass to the available credit. At the 2.1:1 Trade Ratio the available credit is 246.2 lbs. per year, or 166.8 lb/yr at 3.1:1. With the MDV the target mass is 307.5 lbs. per year. The difference yields a shortage of between 61.3-140.7 lbs. per year, depending on whether an aquatic habitat improvement is included. This amount is the shortage if no other WQT projects are implemented and the flow remains constant after the first permit term. As discussed in Section 6, this watershed plan falls under the MDV and as such, the trade ratio for the first permit term is a 1:1. With the 1:1 trade ratio, the streambank project(s) satisfy the phosphorus mass requirements.

#### **16.2 Supporting Documentation**

The bank stabilization projects will require a Chapter 30 permit prior to construction commencing. In order to obtain a Chapter 30 permit, full construction plans need to be in place and submitted to DNR along with the permit application. The bank stabilization projects will require approved plans for a contractor to build the projects. The MDV Watershed Plan approval is completely separate from the chapter 30 permit; however, both permits will be required prior to implementation. The streambank stabilization projects will follow the NRCS 580 code.

## 17 COMPLIANCE WITH WATER QUALITY TRADING CHECKLIST

This Water Quality Trading Plan was produced in accordance with the Wisconsin Department of Natural Resources, *Guidance for Implementing Water Quality Trading in WPDES Permits* based upon the requirements in Chapter 4, Table 5 (2020 p. 45). The Village of Ellsworth will be installing rip rap bank stabilization at two property locations along the Isabelle Creek, to generate credits for the WWTP.

Below is a list of the requirements to be included in a WQT plan per column (e) of Table 5. This list includes a brief statement of where to find the information in this plan.

- Permittee's / credit user's WPDES Permit number. The Village of Ellsworth WWTP WPDES permit number is WI-0021253-09-0 and is referenced in Section 2.
- Permittee's / credit user's contact information. The contact information is included in Section 18.
- Pollutants for which credits will be generated. Credits will be generated for total phosphorus, which is discussed in Section 5.
- Amounts of credits available from each location / management practice / local governmental unit when acting as a broker. The amount of credit available is discussed in Section 16.
- Certification that the content of the trading application is accurate and correct. The certification is included in Section 18.
- Signature and date of the permittee's / credit user's authorized representative. The signature of the authorized representative is included in Section 18.
- Location where credits will be generated (i.e. map of site where management practice will be applied including major drainage ways from the project). The location where credits are generated are discussed in Section 6 and 13.
- Identification of method(s) including management practice(s) that will be used to generate credits at each location. Identifications of methods are discussed in Section 8.
- Duration of agreement (i.e. the design life of the management practice) with each credit generator. The duration of the agreement is discussed in Section 4.
- Schedule for installation / construction of each management practice. The schedule is discussed in Section 7.
- Operation and maintenance plan for each management practice used to generate credits. The operation and maintenance plan are discussed in Section 12.
- Date when credits become available for each management practice (i.e. when practice is established and effective). The date when the credits become effective is December 31, 2021, and this date is referenced in Section 7.
- Models used to derive the amount of credits. The model used to derive the amount of credits for the bank stabilization is a scientific equation for phosphorus loss. This is discussed in Section 8.
- The applicable trade ratio for each management practice including supporting technical basis (see Appendix H on p. 151 of the WQT Guidance). The applicable trade ratio along with the technical basis and calculation of the trade ratio is discussed in Section 5. This trade ratio will not take effect until after the next permit term at the earliest, as this self-directed watershed plan will earn the ratio of 1:1 during the first permit term and the trade ratio effective date will be determined by DNR.

## 18 CERTIFICATION OF WATER QUALITY TRADING PLAN

This plan was prepared by Davy Engineering Co. with assistance from the Pierce County Department of Land Conservation. This Water Quality Trading Plan is complete, accurate and correct, to the best of our knowledge and belief.

Prepared By: Davy Engineering Co., Inc.

Owner: Village of Ellsworth

By: \_\_\_\_\_

Tim Stockman, P.E.  
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By: \_\_\_\_\_

Rebecca Beissel  
Village President  
Village of Ellsworth  
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### References

United States Department of Agriculture. (August 2011). *Stream Habitat Development, Companion Document 580-15*. Natural Resources Conservation Services. doi:EFH Notice 210-WI-122

Wisconsin Department of Natural Resources. (2013). *A Water Quality Trading How To Manual*. doi:Guidance Number: 3400-2013-03

Wisconsin Department of Natural Resources. (2020). *Guidance for Implementing Water Quality Trading in WPDES Permits*. doi:Guidance Number: 3800-2013-04



# **APPENDICES**

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## **APPENDIX 1-1**

### **ELLSWORTH WPDES PERMIT**

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# WPDES PERMIT

*STATE OF WISCONSIN*  
*DEPARTMENT OF NATURAL RESOURCES*  
**PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE  
ELIMINATION SYSTEM**

**Village of Ellsworth**

is permitted, under the authority of Chapter 283, Wisconsin Statutes, to discharge from a facility  
located at

Utility St, Ellsworth, WI  
to

**Isabelle Creek in the Trimbelle and Isabelle Creek Watershed  
of the Lower Chippewa River Basin in Pierce County**

in accordance with the effluent limitations, monitoring requirements and other conditions set  
forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources  
For the Secretary

By

A handwritten signature in dark ink, appearing to read 'Dan Helsel', is written over a horizontal line.

Dan Helsel  
Acting Wastewater Program Supervisor

January 6, 2017\_  
Date Permit Signed/Issued

**PERMIT TERM: EFFECTIVE DATE - February 01, 2017**

**EXPIRATION DATE - December 31, 2021**



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**6 SUMMARY OF REPORTS DUE**

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# 1 Influent Requirements

## 1.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)
701	Representative domestic influent samples shall be collected from the influent channel between the fine screen and selector tank.

## 1.2 Monitoring Requirements

The permittee shall comply with the following monitoring requirements.

### 1.2.1 Sampling Point 701 - INFLUENT PLANT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Continuous	Continuous	
BOD <sub>5</sub> , Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	

## 2 Surface Water Requirements

### 2.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)
001	Representative effluent composite samples shall be collected in the effluent channel before ultraviolet disinfection. Grab samples shall be collected in the effluent channel after disinfection.

### 2.2 Monitoring Requirements and Effluent Limitations

The permittee shall comply with the following monitoring requirements and limitations.

#### 2.2.1 Sampling Point (Outfall) 001 - EFFLUENT

Monitoring Requirements and Effluent Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Continuous	Continuous	
BOD <sub>5</sub> , Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD <sub>5</sub> , Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	1.0 mg/L	3/Week	24-Hr Flow Prop Comp	Interim limit of 1.0 mg/L monthly avg effective throughout permit term. Final limits of 0.075 mg/L, 0.22 lbs/day 6-month avg, and 0.225 mg/L monthly avg effective next permit term. See phosphorus subsection below and compliance schedule.
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
Dissolved Oxygen	Daily Min	4.0 mg/L	Weekly	Grab	
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Daily Max	7.8 mg/L	Weekly	24-Hr Flow Prop Comp	Limit effective Dec-March
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Weekly Avg	7.8 mg/L	Weekly	24-Hr Flow Prop Comp	Limit effective Dec-March
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Monthly Avg	7.8 mg/L	Weekly	24-Hr Flow Prop Comp	Limit effective Dec-March



Monitoring Requirements and Effluent Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Daily Max	8.8 mg/L	Weekly	24-Hr Flow Prop Comp	Limit effective April, Oct, Nov
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Weekly Avg	8.8 mg/L	Weekly	24-Hr Flow Prop Comp	Limit effective April, Oct, Nov
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Monthly Avg	8.8 mg/L	Weekly	24-Hr Flow Prop Comp	Limit effective April, Oct, Nov
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Daily Max	11 mg/L	Weekly	24-Hr Flow Prop Comp	Limit effective May-Sept
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Weekly Avg	9.1 mg/L	Weekly	24-Hr Flow Prop Comp	Limit effective May-Sept
Nitrogen, Ammonia (NH <sub>3</sub> -N) Total	Monthly Avg	3.6 mg/L	Weekly	24-Hr Flow Prop Comp	Limit effective May-Sept
Nitrogen, Total	Monthly Avg	10 mg/L	Weekly	Calculated	
Nitrogen, Nitrite + Nitrate Total		mg/L	Weekly	24-Hr Flow Prop Comp	
Nitrogen, Total Kjeldahl		mg/L	Weekly	24-Hr Flow Prop Comp	
Fecal Coliform	Geometric Mean - Monthly	400 #/100 ml	Weekly	Grab	
Chloride	Monthly Avg	400 mg/L	Weekly	24-Hr Flow Prop Comp	See Chloride subsection below and chlroide compliance schedule.
Chloride	Weekly Avg	400 mg/L	Weekly	24-Hr Flow Prop Comp	See Chloride subsection below and chlroide compliance schedule.
Chloride	Monthly Avg	1,130 lbs/day	Weekly	24-Hr Flow Prop Comp	See Chloride subsection below and chlroide compliance schedule.
Chloride	Weekly Avg	1,130 lbs/day	Weekly	24-Hr Flow Prop Comp	See Chloride subsection below and chlroide compliance schedule.

### 2.2.1.1 Average Annual Design Flow

The average annual design flow of the permittee's wastewater treatment facility is 0.358 MGD.

### 2.2.1.2 Phosphorus Water Quality Based Effluent Limitation(s)

The interim water quality based effluent limit for phosphorus is 1.0 mg/L monthly average and is effective throughout this permit term.

The final water quality based effluent limits for phosphorus are 0.075 mg/L and 0.22 lbs/day 6-month averages, and 0.225 mg/L monthly average, and will take effect per the Compliance Schedule unless:

- (A) As part of the application for the next reissuance, or prior to filing the application, the permittee submits either: 1.) a watershed adaptive management plan and a completed Watershed Adaptive Management Request Form 3200-139; or 2.) an application for water quality trading; or 3.) an application for a variance; or 4.) new information or additional data that supports a recalculation of the numeric limitation; and



- (B) The Department modifies, revokes and reissues, or reissues the permit to incorporate a revised limitation before the expiration of the compliance schedule\*.

Note: The permittee may also submit an application for a variance within 60 days of this permit reissuance, as noted in the permit cover letter, in accordance with s. 283.15, Stats.

If Adaptive Management or Water Quality Trading is approved as part of the permit application for the next reissuance or as part of an application for a modification or revocation and reissuance, the plan and specifications submittal, construction, and final effective dates for compliance with the total phosphorus WQBEL may change in the reissued or modified permit. In addition, the numeric value of the water quality based effluent limit may change based on new information (e.g. a TMDL) or additional data. If a variance is approved for the next reissuance, interim limits and conditions will be imposed in the reissued permit in accordance with s. 283.15, Stats., and applicable regulations. A permittee may apply for a variance to the phosphorus WQBEL at the next reissuance even if the permittee did not apply for a phosphorus variance as part of this permit reissuance.

Additional Requirements: If a water quality based effluent limit has taken effect in a permit, any increase in the limit is subject to s. NR 102.05(1) and ch. NR 207, Wis. Adm. Code. When a six-month average effluent limit is specified for Total Phosphorus the applicable averaging periods are May through October and November through April.

\*Note: The Department will prioritize reissuances and revocations, modifications, and reissuances of permits to allow permittees the opportunity to implement adaptive management or nutrient trading in a timely and effective manner.

### **2.2.1.3 Alternative Approaches to Phosphorus WQBEL Compliance**

Rather than upgrading its wastewater treatment facility to comply with WQBELs for total phosphorus, the permittee may use Water Quality Trading or the Watershed Adaptive Management Option, to achieve compliance under ch. NR 217, Wis. Adm. Code, provided that the permit is modified, revoked and reissued, or reissued to incorporate any such alternative approach. The permittee may also implement an upgrade to its wastewater treatment facility in combination with Water Quality Trading or the Watershed Adaptive Management Option to achieve compliance, provided that the permit is modified, revoked and reissued, or reissued to incorporate any such alternative approach. If the Final Compliance Alternatives Plan concludes that a variance will be pursued, the Plan shall provide information regarding the basis for the variance.

### **2.2.1.4 Submittal of Permit Application for Next Reissuance and Adaptive Management or Pollutant Trading Plan or Variance Application**

The permittee shall submit the permit application for the next reissuance at least 6 months prior to expiration of this permit. If the permittee intends to pursue adaptive management to achieve compliance with the phosphorus water quality based effluent limitation, the permittee shall submit with the application for the next reissuance: a completed Watershed Adaptive Management Request Form 3200-139, the completed Adaptive Management Plan and final plans for any system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the permittee intends to pursue pollutant trading to achieve compliance, the permittee shall submit an application for water quality trading with the application for the next reissuance. If system upgrades will be used in combination with pollutant trading to achieve compliance with the final water quality-based limit, the reissued permit will specify a schedule for the necessary upgrades. If the permittee intends to seek a variance, the permittee shall submit an application for a variance with the application for the next reissuance.

### **2.2.1.5 Chloride Non-Wet Weather and Alternative Wet Weather Mass Limit**

Chloride has a mass limit based on weather conditions. The applicable non-wet weather mass limit is 1130 pounds/day weekly and monthly averages. The applicable wet weather mass limit is 2600 pounds/day weekly and monthly averages. Report the applicable mass limit on the Discharge Monitoring Report form in the variable limit column. See Standard Requirements for "Applicability of Alternative Wet Weather Mass Limitations" and "Appropriate Formulas for Effluent Calculations".

Note: 1000 ug/l = 1 mg/L (divide ug/L by 1000 to convert to mg/L).





### 3 Land Application Requirements

#### 3.1 Sampling Point(s)

The discharge(s) shall be limited to land application of the waste type(s) designated for the listed sampling point(s) on Department approved land spreading sites or by hauling to another facility.

Sampling Point Designation	
Sampling Point Number	Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)
002	As long as sludge is shipped to the West Central Wisconsin Biosolids Facility (WCWBF) for disposal, representative sludge samples shall be collected once per year and monitored for List 1. Sludge samples shall be collected prior to hauling and test results shall be reported on Form 3400-49 "Waste Characteristics Report". Hauled sludge reports shall be submitted on Form 3400-52 "Other Methods of Disposal or Distribution Report" following each year that sludge is hauled.

#### 3.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

##### 3.2.1 Sampling Point (Outfall) 002 - LIQUID SLUDGE

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Solids, Total		Percent	Annual	Grab	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Grab	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Grab	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Grab	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Grab	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Grab	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Grab	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Grab	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Grab	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Grab	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Grab	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Grab	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Grab	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Grab	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Grab	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Grab	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Grab	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Grab	



## 4 Schedules

### 4.1 Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus

The permittee shall comply with the WQBELs for Phosphorus as specified. No later than 30 days following each compliance date, the permittee shall notify the Department in writing of its compliance or noncompliance. If a submittal is required, a timely submittal fulfills the notification requirement.

Required Action	Due Date
<p><b>Operational Evaluation Report:</b> The permittee shall prepare and submit to the Department for approval an operational evaluation report. The report shall include an evaluation of collected effluent data, possible source reduction measures, operational improvements or other minor facility modifications that will optimize reductions in phosphorus discharges from the treatment plant during the period prior to complying with final phosphorus WQBELs and, where possible, enable compliance with final phosphorus WQBELs by 12/31/2019. The report shall provide a plan and schedule for implementation of the measures, improvements, and modifications as soon as possible, but not later than 12/31/2019 and state whether the measures, improvements, and modifications will enable compliance with final phosphorus WQBELs. Regardless of whether they are expected to result in compliance, the permittee shall implement the measures, improvements, and modifications in accordance with the plan and schedule specified in the operational evaluation report.</p> <p>If the operational evaluation report concludes that the facility can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the permittee shall comply with the final phosphorus WQBEL by 12/31/2019 and is not required to comply with the milestones identified below for years 3 through 9 of this compliance schedule ('Preliminary Compliance Alternatives Plan', 'Final Compliance Alternatives Plan', 'Final Plans and Specifications', 'Treatment Plant Upgrade to Meet WQBELs', 'Complete Construction', 'Achieve Compliance').</p> <p><b>STUDY OF FEASIBLE ALTERNATIVES -</b> If the Operational Evaluation Report concludes that the permittee cannot achieve final phosphorus WQBELs with source reduction measures, operational improvements and other minor facility modifications, the permittee shall initiate a study of feasible alternatives for meeting final phosphorus WQBELs and comply with the remaining required actions of this schedule of compliance. If the Department disagrees with the conclusion of the report, and determines that the permittee can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the Department may reopen and modify the permit to include an implementation schedule for achieving the final phosphorus WQBELs sooner than 12/31/2025.</p>	12/31/2017
<p><b>Compliance Alternatives, Source Reduction, Improvements and Modifications Status:</b> The permittee shall submit a 'Compliance Alternatives, Source Reduction, Operational Improvements and Minor Facility Modification' status report to the Department. The report shall provide an update on the permittee's: (1) progress implementing source reduction measures, operational improvements, and minor facility modifications to optimize reductions in phosphorus discharges and, to the extent that such measures, improvements, and modifications will not enable compliance with the WQBELs, (2) status evaluating feasible alternatives for meeting phosphorus WQBELs.</p>	12/31/2018
<p><b>Preliminary Compliance Alternatives Plan:</b> The permittee shall submit a preliminary compliance alternatives plan to the Department.</p> <p>If the plan concludes upgrading of the permittee's wastewater treatment facility is necessary to achieve final phosphorus WQBELs, the submittal shall include a preliminary engineering design report.</p>	12/31/2019



<p>If the plan concludes Adaptive Management will be used, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 without the Adaptive Management Plan.</p> <p>If water quality trading will be undertaken, the plan must state that trading will be pursued.</p>	
<p><b>Final Compliance Alternatives Plan:</b> The permittee shall submit a final compliance alternatives plan to the Department.</p> <p>If the plan concludes upgrading of the permittee's wastewater treatment is necessary to meet final phosphorus WQBELs, the submittal shall include a final engineering design report addressing the treatment plant upgrades, and a facility plan if required pursuant to ch. NR 110, Wis. Adm. Code.</p> <p>If the plan concludes Adaptive Management will be implemented, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 and an engineering report addressing any treatment system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code.</p> <p>If the plan concludes water quality trading will be used, the submittal shall identify potential trading partners.</p> <p>Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.</p>	12/31/2020
<p><b>Progress Report on Plans &amp; Specifications:</b> Submit progress report regarding the progress of preparing final plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.</p>	12/31/2021
<p><b>Final Plans and Specifications:</b> Unless the permit has been modified, revoked and reissued, or reissued to include Adaptive Management or Water Quality Trading measures or to include a revised schedule based on factors in s. NR 217.17, Wis. Adm. Code, the permittee shall submit final construction plans to the Department for approval pursuant to s. 281.41, Stats., specifying treatment plant upgrades that must be constructed to achieve compliance with final phosphorus WQBELs, and a schedule for completing construction of the upgrades by the complete construction date specified below. (Note: Permit modification, revocation and reissuance, and reissuance are subject to s. 283.53(2), Stats.)</p> <p>Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.</p>	12/31/2022
<p><b>Treatment Plant Upgrade to Meet WQBELs:</b> The permittee shall initiate construction of the upgrades. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41, Stats. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.</p>	03/31/2023
<p><b>Construction Upgrade Progress Report #1:</b> The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.</p>	03/31/2024
<p><b>Construction Upgrade Progress Report #2:</b> The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.</p>	03/31/2025
<p><b>Complete Construction:</b> The permittee shall complete construction of wastewater treatment system upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.</p>	11/30/2025



<b>Achieve Compliance:</b> The permittee shall achieve compliance with final phosphorus WQBELs. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	12/31/2025
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## 4.2 Chloride Source Reduction

Required Action	Due Date
<b>Annual Chloride Progress Report:</b> Submit an annual progress report that shall indicate which chloride source reduction measures have been implemented. The report shall also include a calculated annual mass discharge of chloride based on chloride sampling and flow data.	01/31/2017
<b>Annual Chloride Progress Report:</b> Submit a chloride progress report.	01/31/2018
<b>Annual Progress Report:</b> Submit a Chloride progress report .	01/31/2019
<b>Final Chloride Report:</b> Submit the final report documenting the success in meeting the chloride post-upgrade value of 325 mg/L, as well as the anticipated future reduction in salt usage and chloride effluent concentrations.	01/31/2020
<b>New Chloride Limit is Effective:</b> The chloride limit of 325 mg/L weekly average becomes effective 01/01/2021.	01/01/2021

## 5 Standard Requirements

**NR 205, Wisconsin Administrative Code:** The conditions in ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(2).

### 5.1 Reporting and Monitoring Requirements

#### 5.1.1 Monitoring Results

Monitoring results obtained during the previous month shall be summarized and reported on a Department Wastewater Discharge Monitoring Report. The report may require reporting of any or all of the information specified below under 'Recording of Results'. This report is to be returned to the Department no later than the date indicated on the form. A copy of the Wastewater Discharge Monitoring Report Form or an electronic file of the report shall be retained by the permittee.

Monitoring results shall be reported on an electronic discharge monitoring report (eDMR). The eDMR shall be certified electronically by a principal executive officer, a ranking elected official or other duly authorized representative. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included on the Wastewater Discharge Monitoring Report.

The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

#### 5.1.2 Sampling and Testing Procedures

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

#### 5.1.3 Recording of Results

The permittee shall maintain records which provide the following information for each effluent measurement or sample taken:

- the date, exact place, method and time of sampling or measurements;
- the individual who performed the sampling or measurements;
- the date the analysis was performed;
- the individual who performed the analysis;
- the analytical techniques or methods used; and
- the results of the analysis.

#### 5.1.4 Reporting of Monitoring Results

The permittee shall use the following conventions when reporting effluent monitoring results:

- Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 0.1 mg/L, report the



pollutant concentration as  $< 0.1$  mg/L.

- Pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified.
- For purposes of calculating NR 101 fees, the 2 mg/l lower reporting limits for BOD<sub>5</sub> and Total Suspended Solids shall be considered to be limits of quantitation
- For the purposes of reporting a calculated result, average or a mass discharge value, the permittee may substitute a 0 (zero) for any pollutant concentration that is less than the limit of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

### **5.1.5 Compliance Maintenance Annual Reports**

Compliance Maintenance Annual Reports (CMAR) shall be completed using information obtained over each calendar year regarding the wastewater conveyance and treatment system. The CMAR shall be submitted by the permittee in accordance with ch. NR 208, Wis. Adm. Code, by June 30, each year on an electronic report form provided by the Department.

In the case of a publicly owned treatment works, a resolution shall be passed by the governing body and submitted as part of the CMAR, verifying its review of the report and providing responses as required. Private owners of wastewater treatment works are not required to pass a resolution; but they must provide an Owner Statement and responses as required, as part of the CMAR submittal.

A separate CMAR certification document, that is not part of the electronic report form, shall be mailed to the Department at the time of electronic submittal of the CMAR. The CMAR certification shall be signed and submitted by an authorized representative of the permittee. The certification shall be submitted by mail. The certification shall verify the electronic report is complete, accurate and contains information from the owner's treatment works.

### **5.1.6 Records Retention**

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application. All pertinent sludge information, including permit application information and other documents specified in this permit or s. NR 204.06(9), Wis. Adm. Code shall be retained for a minimum of 5 years.

### **5.1.7 Other Information**

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or correct information to the Department.

## **5.2 System Operating Requirements**

### **5.2.1 Noncompliance Reporting**

Sanitary sewer overflows and sewage treatment facility overflows shall be reported according to the 'Sanitary Sewer Overflows and Sewage Treatment Facility Overflows' section of this permit.



The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance:

- any noncompliance which may endanger health or the environment;
- any violation of an effluent limitation resulting from a bypass;
- any violation of an effluent limitation resulting from an upset; and
- any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the permit, either for effluent or sludge.

A written report describing the noncompliance shall also be submitted to the Department's regional office within 5 days after the permittee becomes aware of the noncompliance. On a case-by-case basis, the Department may waive the requirement for submittal of a written report within 5 days and instruct the permittee to submit the written report with the next regularly scheduled monitoring report. In either case, the written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

A scheduled bypass approved by the Department under the 'Scheduled Bypass' section of this permit shall not be subject to the reporting required under this section.

**NOTE:** Section 292.11(2)(a), Wisconsin Statutes, requires any person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance to notify the Department of Natural Resources **immediately** of any discharge not authorized by the permit. **The discharge of a hazardous substance that is not authorized by this permit or that violates this permit may be a hazardous substance spill. To report a hazardous substance spill, call DNR's 24-hour HOTLINE at 1-800-943-0003.**

## 5.2.2 Flow Meters

Flow meters shall be calibrated annually, as per s. NR 218.06, Wis. Adm. Code.

## 5.2.3 Raw Grit and Screenings

All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they shall be licensed under chs. NR 500-536, Wis. Adm. Code.

## 5.2.4 Sludge Management

All sludge management activities shall be conducted in compliance with ch. NR 204 "Domestic Sewage Sludge Management", Wis. Adm. Code.

## 5.2.5 Prohibited Wastes

Under no circumstances may the introduction of wastes prohibited by s. NR 211.10, Wis. Adm. Code, be allowed into the waste treatment system. Prohibited wastes include those:

- which create a fire or explosion hazard in the treatment work;
- which will cause corrosive structural damage to the treatment work;
- solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;
- wastewaters at a flow rate or pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; and
- changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.



### **5.2.6 Bypass**

This condition applies only to bypassing at a sewage treatment facility that is not a scheduled bypass, approved blending as a specific condition of this permit, a sewage treatment facility overflow or a controlled diversion as provided in the sections titled 'Scheduled Bypass', 'Blending' (if approved), 'SSO's and Sewage Treatment Facility Overflows' and 'Controlled Diversions' of this permit. Any other bypass at the sewage treatment facility is prohibited and the Department may take enforcement action against a permittee for such occurrences under s. 283.89, Wis. Stats. The Department may approve a bypass if the permittee demonstrates all the following conditions apply:

- The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance. When evaluating feasibility of alternatives, the department may consider factors such as technical achievability, costs and affordability of implementation and risks to public health, the environment and, where the permittee is a municipality, the welfare of the community served; and
- The bypass was reported in accordance with the Noncompliance Reporting section of this permit.

### **5.2.7 Scheduled Bypass**

Whenever the permittee anticipates the need to bypass for purposes of efficient operations and maintenance and the permittee may not meet the conditions for controlled diversions in the 'Controlled Diversions' section of this permit, the permittee shall obtain prior written approval from the Department for the scheduled bypass. A permittee's written request for Department approval of a scheduled bypass shall demonstrate that the conditions for bypassing specified in the above section titled 'Bypass' are met and include the proposed date and reason for the bypass, estimated volume and duration of the bypass, alternatives to bypassing and measures to mitigate environmental harm caused by the bypass. The department may require the permittee to provide public notification for a scheduled bypass if it is determined there is significant public interest in the proposed action and may recommend mitigation measures to minimize the impact of such bypass.

### **5.2.8 Controlled Diversions**

Controlled diversions are allowed only when necessary for essential maintenance to assure efficient operation. Sewage treatment facilities that have multiple treatment units to treat variable or seasonal loading conditions may shut down redundant treatment units when necessary for efficient operation. The following requirements shall be met during controlled diversions:

- Effluent from the sewage treatment facility shall meet the effluent limitations established in the permit. Wastewater that is diverted around a treatment unit or treatment process during a controlled diversion shall be recombined with wastewater that is not diverted prior to the effluent sampling location and prior to effluent discharge;
- A controlled diversion does not include blending as defined in s. NR 210.03(2e), Wis. Adm. Code, and as may only be approved under s. NR 210.12. A controlled diversion may not occur during periods of excessive flow or other abnormal wastewater characteristics;
- A controlled diversion may not result in a wastewater treatment facility overflow; and
- All instances of controlled diversions shall be documented in sewage treatment facility records and such records shall be available to the department on request.

### **5.2.9 Proper Operation and Maintenance**

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. The wastewater



treatment facility shall be under the direct supervision of a state certified operator as required in s. NR 108.06(2), Wis. Adm. Code. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114, Wis. Adm. Code, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

## **5.3 Sewage Collection Systems**

### **5.3.1 Sanitary Sewage Overflows and Sewage Treatment Facility Overflows**

#### **5.3.1.1 Overflows Prohibited**

Any overflow or discharge of wastewater from the sewage collection system or at the sewage treatment facility, other than from permitted outfalls, is prohibited. The permittee shall provide information on whether any of the following conditions existed when an overflow occurred:

- The sanitary sewer overflow or sewage treatment facility overflow was unavoidable to prevent loss of life, personal injury or severe property damage;
- There were no feasible alternatives to the sanitary sewer overflow or sewage treatment facility overflow such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or preventative maintenance activities;
- The sanitary sewer overflow or the sewage treatment facility overflow was caused by unusual or severe weather related conditions such as large or successive precipitation events, snowmelt, saturated soil conditions, or severe weather occurring in the area served by the sewage collection system or sewage treatment facility; and
- The sanitary sewer overflow or the sewage treatment facility overflow was unintentional, temporary, and caused by an accident or other factors beyond the reasonable control of the permittee.

#### **5.3.1.2 Permittee Response to Overflows**

Whenever a sanitary sewer overflow or sewage treatment facility overflow occurs, the permittee shall take all feasible steps to control or limit the volume of untreated or partially treated wastewater discharged, and terminate the discharge as soon as practicable. Remedial actions, including those in NR 210.21 (3), Wis. Adm. Code, shall be implemented consistent with an emergency response plan developed under the CMOM program.

#### **5.3.1.3 Permittee Reporting**

Permittees shall report all sanitary sewer overflows and sewage treatment overflows as follows:

- The permittee shall notify the department by telephone, fax or email as soon as practicable, but no later than 24 hours from the time the permittee becomes aware of the overflow;
- The permittee shall, no later than five days from the time the permittee becomes aware of the overflow, provide to the department the information identified in this paragraph using department form number 3400-184. If an overflow lasts for more than five days, an initial report shall be submitted within 5 days as required in this paragraph and an updated report submitted following cessation of the overflow. At a minimum, the following information shall be included in the report:
  - The date and location of the overflow;
  - The surface water to which the discharge occurred, if any;
  - The duration of the overflow and an estimate of the volume of the overflow;
  - A description of the sewer system or treatment facility component from which the discharge occurred such as manhole, lift station, constructed overflow pipe, or crack or other opening in a pipe;
  - The estimated date and time when the overflow began and stopped or will be stopped;



- The cause or suspected cause of the overflow including, if appropriate, precipitation, runoff conditions, areas of flooding, soil moisture and other relevant information;
- Steps taken or planned to reduce, eliminate and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
- A description of the actual or potential for human exposure and contact with the wastewater from the overflow;
- Steps taken or planned to mitigate the impacts of the overflow and a schedule of major milestones for those steps;
- To the extent known at the time of reporting, the number and location of building backups caused by excessive flow or other hydraulic constraints in the sewage collection system that occurred concurrently with the sanitary sewer overflow and that were within the same area of the sewage collection system as the sanitary sewer overflow; and
- The reason the overflow occurred or explanation of other contributing circumstances that resulted in the overflow event. This includes any information available including whether the overflow was unavoidable to prevent loss of life, personal injury, or severe property damage and whether there were feasible alternatives to the overflow.

**NOTE:** A copy of form 3400-184 for reporting sanitary sewer overflows and sewage treatment facility overflows may be obtained from the department or accessed on the department's web site at <http://dnr.wi.gov/topic/wastewater/SSOreport.html>. As indicated on the form, additional information may be submitted to supplement the information required by the form.

- The permittee shall identify each specific location and each day on which a sanitary sewer overflow or sewage treatment facility overflow occurs as a discrete sanitary sewer overflow or sewage treatment facility overflow occurrence. An occurrence may be more than one day if the circumstances causing the sanitary sewer overflow or sewage treatment facility overflow results in a discharge duration of greater than 24 hours. If there is a stop and restart of the overflow at the same location within 24 hours and the overflow is caused by the same circumstance, it may be reported as one occurrence. Sanitary sewer overflow occurrences at a specific location that are separated by more than 24 hours shall be reported as separate occurrences; and
- A permittee that is required to submit wastewater discharge monitoring reports under NR 205.07 (1) (r) shall also report all sanitary sewer overflows and sewage treatment facility overflows on that report.

#### **5.3.1.4 Public Notification**

The permittee shall notify the public of any sanitary sewer and sewage treatment facility overflows consistent with its emergency response plan required under the CMOM (Capacity, Management, Operation and Maintenance) section of this permit and s. NR 210.23 (4) (f), Wis. Adm. Code. Such public notification shall occur promptly following any overflow event using the most effective and efficient communications available in the community. At minimum, a daily newspaper of general circulation in the county(s) and municipality whose waters may be affected by the overflow shall be notified by written or electronic communication.

#### **5.3.2 Capacity, Management, Operation and Maintenance (CMOM) Program**

- The permittee shall verify that a CMOM program for the sewage collection system has been developed which is consistent with the requirements of NR 210.23, Wis. Adm. Code.
- The permittee shall develop and maintain written documentation of the CMOM program components, and shall verify each year with the submittal of the Compliance Maintenance Annual Report required under the 'Compliance Maintenance Annual Reports' section of this permit that the CMOM program documentation is current and meets the requirements in NR 210.23, Wis. Adm. Code.



- The permittee shall implement a CMOM program consistent with the permittee's program documentation and with the requirements of NR 210.23, Wis. Adm. Code.
- The permittee shall annually conduct a self-audit of activities to ensure the CMOM program is being implemented as necessary to meet the requirements contained in the CMOM program documentation.
- The permittee shall make available CMOM program documentation, a record of implementation activities and the results of the self-audit to the Department on request.

### **5.3.3 Sewer Cleaning Debris and Materials**

All debris and material removed from cleaning sanitary sewers shall be managed to prevent nuisances, run-off, ground infiltration or prohibited discharges.

- Debris and solid waste shall be dewatered, dried and then disposed of at a licensed solid waste facility.
- Liquid waste from the cleaning and dewatering operations shall be collected and disposed of at a permitted wastewater treatment facility.
- Combination waste including liquid waste along with debris and solid waste may be disposed of at a licensed solid waste facility or wastewater treatment facility willing to accept the waste.

## **5.4 Land Application Requirements**

### **5.4.1 Sludge Management Program Standards And Requirements Based Upon Federally Promulgated Regulations**

In the event that new federal sludge standards or regulations are promulgated, the permittee shall comply with the new sludge requirements by the dates established in the regulations, if required by federal law, even if the permit has not yet been modified to incorporate the new federal regulations.

### **5.4.2 General Sludge Management Information**

The General Sludge Management Form 3400-48 shall be completed and submitted prior to any significant sludge management changes.

### **5.4.3 Sludge Samples**

All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test.

### **5.4.4 Land Application Characteristic Report**

Each report shall consist of a Characteristic Form 3400-49 and Lab Report. The Characteristic Report Form 3400-49 shall be submitted electronically by January 31 following each year of analysis.

Following submittal of the electronic Characteristic Report Form 3400-49, this form shall be certified electronically via the 'eReport Certify' page by a principal executive officer, ranking elected official or duly authorized representative. The 'eReport Certify' page certifies that the electronic report is true, accurate and complete. The Lab Report must be sent directly to the facility's DNR sludge representative or basin engineer unless approval for not submitting the lab reports has been given.

The permittee shall use the following convention when reporting sludge monitoring results: Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 1.0 mg/kg, report the pollutant concentration as < 1.0 mg/kg.

All results shall be reported on a dry weight basis.

### **5.4.5 Calculation of Water Extractable Phosphorus**



When sludge analysis for Water Extractable Phosphorus is required by this permit, the permittee shall use the following formula to calculate and report Water Extractable Phosphorus:

Water Extractable Phosphorus (% of Total P) =

$$[\text{Water Extractable Phosphorus (mg/kg, dry wt)} \div \text{Total Phosphorus (mg/kg, dry wt)}] \times 100$$

#### **5.4.6 Annual Land Application Report**

Land Application Report Form 3400-55 shall be submitted electronically by January 31, each year whether or not non-exceptional quality sludge is land applied. Non-exceptional quality sludge is defined in s. NR 204.07(4), Wis. Adm. Code. Following submittal of the electronic Annual Land Application Report Form 3400-55, this form shall be certified electronically via the 'eReport Certify' page by a principal executive officer, ranking elected official or duly authorized representative. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

#### **5.4.7 Other Methods of Disposal or Distribution Report**

The permittee shall submit electronically the Other Methods of Disposal or Distribution Report Form 3400-52 by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied. Following submittal of the electronic Report Form 3400-52, this form shall be certified electronically via the 'eReport Certify' page by a principal executive officer, ranking elected official or duly authorized representative. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

#### **5.4.8 Approval to Land Apply**

Bulk non-exceptional quality sludge as defined in s. NR 204.07(4), Wis. Adm. Code, may not be applied to land without a written approval letter or Form 3400-122 from the Department unless the Permittee has obtained permission from the Department to self approve sites in accordance with s. NR 204.06 (6), Wis. Adm. Code. Analysis of sludge characteristics is required prior to land application. Application on frozen or snow covered ground is restricted to the extent specified in s. NR 204.07(3) (I), Wis. Adm. Code.

#### **5.4.9 Soil Analysis Requirements**

Each site requested for approval for land application must have the soil tested prior to use. Each approved site used for land application must subsequently be soil tested such that there is at least one valid soil test in the four years prior to land application. All soil sampling and submittal of information to the testing laboratory shall be done in accordance with UW Extension Bulletin A-2100. The testing shall be done by the UW Soils Lab in Madison or Marshfield, WI or at a lab approved by UW. The test results including the crop recommendations shall be submitted to the DNR contact listed for this permit, as they are available. Application rates shall be determined based on the crop nitrogen recommendations and with consideration for other sources of nitrogen applied to the site.

#### **5.4.10 Land Application Site Evaluation**

For non-exceptional quality sludge, as defined in s. NR 204.07(4), Wis. Adm. Code, a Land Application Site Request Form 3400-053 shall be submitted to the Department for the proposed land application site. The Department will evaluate the proposed site for acceptability and will either approve or deny use of the proposed site. The permittee may obtain permission to approve their own sites in accordance with s. NR 204.06(6), Wis. Adm. Code.

#### **5.4.11 Sludge Hauling**

If sludge is hauled to another facility, the permittee is required to submit Form 3400-52 to the Department. Information shall include the quantity of sludge hauled, the name, address, phone number, contact person, and permit number of the receiving facility. Form 3400-52 shall be submitted annually by January 31 following each year sludge is hauled.



## 6 Summary of Reports Due

FOR INFORMATIONAL PURPOSES ONLY

Description	Date	Page
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Operational Evaluation Report	December 31, 2017	8
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Compliance Alternatives, Source Reduction, Improvements and Modifications Status	December 31, 2018	8
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Preliminary Compliance Alternatives Plan	December 31, 2019	8
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Final Compliance Alternatives Plan	December 31, 2020	9
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Progress Report on Plans & Specifications	December 31, 2021	9
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Final Plans and Specifications	December 31, 2022	9
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Treatment Plant Upgrade to Meet WQBELs	March 31, 2023	9
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Construction Upgrade Progress Report #1	March 31, 2024	9
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Construction Upgrade Progress Report #2	March 31, 2025	9
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Complete Construction	November 30, 2025	10
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Achieve Compliance	December 31, 2025	10
Chloride Source Reduction -Annual Chloride Progress Report	January 31, 2017	10
Chloride Source Reduction -Annual Chloride Progress Report	January 31, 2018	10
Chloride Source Reduction -Annual Progress Report	January 31, 2019	10
Chloride Source Reduction -Final Chloride Report	January 31, 2020	10
Chloride Source Reduction -New Chloride Limit is Effective	January 1, 2021	10
Compliance Maintenance Annual Reports (CMAR)	by June 30, each year	11
General Sludge Management Form 3400-48	prior to any significant sludge management changes	16
Characteristic Form 3400-49 and Lab Report	by January 31 following each year of analysis	16

Land Application Report Form 3400-55	by January 31, each year whether or not non-exceptional quality sludge is land applied	17
Report Form 3400-52	by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied	17
Wastewater Discharge Monitoring Report	no later than the date indicated on the form	10

Report forms shall be submitted electronically in accordance with the reporting requirements herein. Any facility plans or plans and specifications for municipal, industrial, industrial pretreatment and non industrial wastewater systems shall be submitted to the Bureau of Water Quality, P.O. Box 7921, Madison, WI 53707-7921. All other submittals required by this permit shall be submitted to:

West Central Region - Baldwin, 890 Spruce Street, Baldwin, WI 54002



## **APPENDIX 1-2**

### **WWTP LOCATION TOPOGRAPHIC MAP**

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Figure 2-2  
Village of Ellsworth  
WWTP Area Topographic Map

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## **APPENDIX 2-1**

### **MDV CHECKLIST, NOTICE OF INTENT, AND PRESTO WATERSHED REPORT**

# Multi-Discharger Variance Application Evaluation Checklist

Form 3200-145 (R 5/16)

Page 1 of 4

**Notice:** This checklist is meant to be a tool to help Department of Natural Resources (DNR) staff review municipal and industrial multi-discharger variance (MDV) applications (Forms 3200-149 and 3200-150). Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31-19.39, Wis. Stats.).

Permittee Name

Village of Ellsworth

WPDES Permit Number

WI- 0 | 0 | 2 | 1 | 2 | 5 | 3

County

Pierce

1. Did the point source apply for the MDV at the appropriate time?	<input checked="" type="radio"/> Yes <input type="radio"/> No. STOP- facility not eligible at this time.	See Questions 1-3.
2. This operation is (check one):	<input type="radio"/> New or relocated outfall. STOP- facility not eligible. <input checked="" type="radio"/> Existing outfall	See Questions 5-6.
3. Is the point source is located in an MDV eligible area?	<input checked="" type="radio"/> Yes <input type="radio"/> No. STOP- facility not eligible.	Apply County information to Appendix H. Additional information provided in Q7 on municipal form & Q7-8 on industrial form.
4. The secondary indicator score for the county (counties) the discharge is located is:	4	See Appendices A-F. If the score is less than 2, stop; the facility is not eligible. See Q23 on municipal form & Q28 on industrial form.
5. Is a major facility upgrade required to comply with phosphorus limits?	<input checked="" type="radio"/> Yes <input type="radio"/> No. STOP- facility not eligible.	See Q8 on municipal form/Q9 on industrial form.
6. List the months where phosphorus limits cannot be achieved during the permit term:	<input checked="" type="checkbox"/> All <input checked="" type="checkbox"/> Jan <input checked="" type="checkbox"/> Apr <input checked="" type="checkbox"/> Jul <input checked="" type="checkbox"/> Oct <input checked="" type="checkbox"/> Feb <input checked="" type="checkbox"/> May <input checked="" type="checkbox"/> Aug <input checked="" type="checkbox"/> Nov <input checked="" type="checkbox"/> Mar <input checked="" type="checkbox"/> Jun <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Dec	Consider checking with limit calculator. If this does not match information in application, the application should be updated prior to approval.

7. What is the current effluent level achievable?

Outfall Number(s)	Conc. (mg/L)	Method for calculation:	Does this concur with application?	
001	0.68	<input checked="" type="radio"/> 30-day P99 <input type="radio"/> Other, specify:	<input type="radio"/> Yes <input checked="" type="radio"/> No, why not:	DNR staff should verify the effluent concentration value(s) provided. See Q11 on municipal form & Q12 on industrial form.
			Application used different data subset	

8. What is the appropriate interim limitation(s) for the permit term?

0.6 mg/L as a monthly average pursuant to s. 283.16 (7), Wis. Stats.

Target Value = 0.2 mg/L

A short compliance schedule may be needed.

Provide Rationale:

The 30-day P99, based on the previous three years of data (1/18-12/20, n=467) is 0.68 mg/L. The interim limit, effective upon permit reissuance, will be calculated in the WQBEL memo and may differ from 0.6 mg/L as calculated above. If MDV is requested for a future permit term, HAC will be reevaluated based on recent data.

Note: See description in Section 2.02 of the MDV implementation guidance. Interim limitations should reflect the "highest attainable condition" for the permittee in question pursuant to s. 283.16(7), Wis. Stat.



9. <i>For Industries Only-</i> Where does the phosphorus in the effluent come from? (check all that apply)	<input type="checkbox"/> Process <input type="checkbox"/> Additive Usage <input type="checkbox"/> Water supply  <i>Can intake credits be given or can the facility use an alternative water supply?</i> <input type="radio"/> Not feasible <input type="radio"/> Possibly, but further analysis needed <input type="radio"/> Not evaluated at this time	See Q14-15 & 19 on industrial form. If the answer is "possibly" or "not evaluated", the schedule section of the MDV permit should contain a requirement to perform this analysis.
10. Has this facility optimized?	<input checked="" type="radio"/> Yes <input type="radio"/> In progress <input type="radio"/> No	See Q14 on municipal form & Q16 & 20 on industrial form. Facility must optimize and operate at an optimize treatment level (s. 283.16(6)(a), Wis. Stat.) If no will need compliance schedule.
11. Has a facility plan/compliance alternative plan been completed for the facility?	<input type="radio"/> Yes <input checked="" type="radio"/> In progress <input type="radio"/> No	See Q15 on municipal form & Q17 on industrial form.
12. What is the projected cost for complying with phosphorus?  Source:	\$ 10,469,140.00  Final Compliance Alternatives Plan. Note this value is not clearly supported in the Plan.	Facility must submit site-specific compliance costs. If cost projections are used from EIA, the permittee must certify that these costs are reasonable for the facility in question. See "projected compliance costs" in Section 2.02 of the MDV Implementation Guidance for details.

## Comments on planning efforts:

A final compliance alternatives plan, dated December 2020, was prepared by Davy Engineering and submitted on behalf of the Village of Ellsworth. The plan provides a facility background and description of treatment limitations surrounding the low phosphorus WQBEL. Regionalization is evaluated, and with the nearest neighbor 11 miles away and without additional treatment capacity, regionalization is deemed infeasible. Land application of wastewater and alternative discharge location were ruled out in the preliminary compliance alternatives plan. The plan indicates that water quality trading may be feasible in future permit terms once adequate credits are obtained. Projects are identified which are proposed to fulfill the watershed offset requirements of the MDV. Tertiary treatment options are also explored - a site specific cost estimate is provided and used in the economic demonstration below.

13. Are adaptive management and water quality trading viable?	<input type="radio"/> Yes <input checked="" type="radio"/> Perhaps. Additional analysis required. <input type="radio"/> No	See Q18-21 on municipal form & Q22-25 on industrial form. If additional analyses required, the applicant may need to complete this analysis during the MDV permit term.
14. Has the point source met the appropriate primary screener?	<input checked="" type="radio"/> Yes <input type="radio"/> No. STOP- facility not eligible.	See Q4 of this form in addition to the "eligibility" guidance in Section 2.01 of the MDV Implementation Guidance.

## Comments on economic demonstration:

A site specific cost estimate is provided for adding tertiary filtration to the facility. Capital costs are estimated at 2,749,300.00 and annual O&M increase is estimated at \$42,201. These costs are slightly lower than those estimated for the Village of Ellsworth in the Addendum to the Phosphorus Economic Impact Analysis, Appendix G (3.2 Million capital costs and 89,000 annual O&M increase). Based on a 20-year clean water fund loan for capital costs (as estimated for the FCAP) at 1.65% interest, annual debt service would be \$161,485. Coupled with annual O&M costs, the total annual cost is \$203,695, or \$164,992 when accounting for the 19% nonresidential share. This cost, divided amongst 1972 customer households, results in an annual per-user rate increase of \$83.67 per year. Current rates are \$729 per year, and future sewer rates would be \$812.67, or 1.47% of the Village's \$55,278 MHI. In Pierce County (Secondary Indicator score of 4) a 1% MHI sewer rate meets the primary screener. The Village is economically eligible for MDV.



15. What watershed option was selected?

- ☐ County project option. *Complete Section 5.*
- ☐ Binding, written agreement with the DNR to construct a project or implement a watershed plan. *Complete Section 4.*
- ☒ Binding, written agreement with another person that is approved by the DNR to construct a project or implement a watershed plan. *Complete Section 4.*

**Section 4. Watershed Plan Review**

16. MDV Plan Number:

MDV-2021-0001

*Note: This is for tracking purposes. Contact Statewide Phosphorus Implementation Coordinator for the plan number.*

17. Did the point source complete Form 3200-148?

- ☒ Yes
- ☐ No

18. Is the project area in the same HUC 8 watershed as the point of discharge?

- ☒ Yes
- ☐ No. *STOP- Watershed plan must be updated.*

19. What is the annual offset required?

443 lbs/yr (per checklist)

*See Section 2.03 of the MDV implementation guidance. If this value is different from the offset target provided in form 3200-148, the watershed plan should be amended.*

20. Does the plan ensure that the annual load is offset annually?

- ☐ Yes
- ☒ No. *STOP- Watershed plan must be updated.*

21. Are projects occurring on land owned/operated by a CAFO or within a permitted MS4 boundary?

- ☐ Yes. *Work with appropriate DNR staff to ensure projects are not working towards other permit compliance.*
- ☐ No.

22. Are other funding sources being used as part of the MDV watershed project?

- ☐ Yes. *Work with appropriate DNR staff to ensure that funding sources can be appropriately used in the plan area.*
- ☐ No.

23. Do you have any concerns about the watershed project?

*Note: Coordinate with other DNR staff as appropriate.*

- ☐ Yes. *STOP- Watershed plan must be updated.*
- ☐ No.

Comments:

Materials submitted thus far do not contain adequate information to document that the required MDV watershed offset will be obtained through the proposed projects. The time line for establishing these projects is also unclear. DNR would like to engage in further discussion focusing on the proposed lateral recession rate of streambanks.

**Section 5. Payment to the County(ies)**

24. At this time, the appropriate per pound payment is:

\$

See "Payment Calculator" document at

[\\central\\water\\WQWT\\_PROJECTS\\WY\\_CW\\_Phosphorus\\MDV.](#)

**Section 6. Determination**

Based on the available information, the MDV application is:

- ☐ Approved
- ☒ Request for more information
- ☐ Denied

Additional Justification (if needed):

A stand alone MDV watershed plan is needed. Please ensure the plan contains all required components. Binding, written agreements supporting the streambank projects should be submitted to DNR with the watershed plan.

**Certification**

Preparer Name

Title

Matt Claucherty

Water Resources Managment Specialist

Signature of Preparer

Sign

Clear

*Matthew Claucherty*

Date

1/29/21

A copy of this completed checklist should be saved in SWAMP, and a notification of the decision should be sent to the Phosphorus Implementation Coordinator.

[Submit to Coordinator...](#)[Save](#)

Notice: Pursuant to s. 283.84, Wis. Stats., and ch. NR 217 Wis. Adm. Code, this form must be completed by any WPDES permittee that is using water quality trading as a method of complying with a permit limitation. Failure to complete this form would not result in penalties. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31 - 19.39, Wis. Stats.).

**Applicant Information**

Permittee Name Village of Ellsworth		Permit Number WI- 0021253-09-0	Facility Site Number	
Facility Address 212 S. Utility St.		City Ellsworth	State WI	ZIP Code 54011
Project Contact Name (if applicable) Greg Engeset	Address 130 N. Chestnut St.	City Ellsworth	State WI	ZIP Code 54011
Project Name Ellsworth Water Quality Trade				
Receiving Water Name Isabelle Creek	Parameter(s) being traded Phosphorus	HUC 12(s) 070400010701 - See List of HUC 12s		

Is the permittee in a point or nonpoint source dominated watershed? ☐ Point source dominated  
(See PRESTO results - <http://dnr.wi.gov/topic/surfacewater/presto.html>) ☐ Nonpoint source dominated

**Credit Generator Information**

Credit generator type (select all that apply):  
☐ Permitted Discharge (non-MS4/CAFO) ☒ Urban nonpoint source discharge  
☐ Permitted MS4 ☒ Agricultural nonpoint source discharge  
☐ Permitted CAFO ☐ Other - Specify: \_\_\_\_\_

Are any of the credit generators in a different HUC 12 than the applicant? ☐ Yes; HUC 12: \_\_\_\_\_  
☒ No  
☐ Unsure

Are any of the credit generators downstream of the applicant? ☒ Yes  
☐ No  
☐ Unsure

Will a broker/exchange be used to facilitate trade? ☒ Yes; Name: Pierce County  
☐ No  
☐ Unsure

**Point to Point Trades (Traditional Municipal / Industrial Discharge, MS4, CAFO)**

Discharge Type	Permit Number	Name	Contact Address	Is the point source credit generator currently in compliance with their permit requirements?
<input type="radio"/> Traditional <input type="radio"/> MS4 <input type="radio"/> CAFO				<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unsure
<input type="radio"/> Traditional <input type="radio"/> MS4 <input type="radio"/> CAFO				<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unsure
<input type="radio"/> Traditional <input type="radio"/> MS4 <input type="radio"/> CAFO				<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unsure
<input type="radio"/> Traditional <input type="radio"/> MS4 <input type="radio"/> CAFO				<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unsure
<input type="radio"/> Traditional <input type="radio"/> MS4 <input type="radio"/> CAFO				<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unsure



# Notice of Intent to Conduct Water Quality Trading

Form 3400-206 (1/14)

Page 2 of 2

## Point to Nonpoint Trades (Non-permitted Agricultural, Non-Permitted Urban, etc.)

List the practices that will be used to generate credits:

Streambank Stabilization  
Improved Farming Practices  
Land Cover Conversion

Anticipated HUC 12s will be 070400010701, 070400010301, 070400010504, 070400010302, & 070400010303

Potential Water Quality Trade projects available in the HUC 12 on privately owned property utilizing streambank stabilization along Isabelle Creek or other crop management practices. Numerous locations along Isabelle Creek have significant bank erosion and the adjacent area is pastured.

Method for quantifying credits generated: ☐ Monitoring  
☒ Modeling, Names: Streambank P calc., Snapplus  
☐ Other: \_\_\_\_\_

Projected date credits will be available:

### The preparer certifies all of the following:

- I am familiar with the specifications submitted for this application, and I believe all applicable items in this checklist have been addressed.
- I have completed this document to the best of my knowledge and have not excluded pertinent information.

Signature of Preparer

Date Signed

10/14/2020

### Authorized Representative Signature

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision. Based on my inquiry of those persons directly responsible for gathering and entering the information, the information is, to the best of my knowledge and belief, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature of Authorized Representative

Date Signed

10/14/20

# PRESTO-Lite Watershed Delineation Report

Reach ID: 200119788

Watershed Name: Isabelle Creek

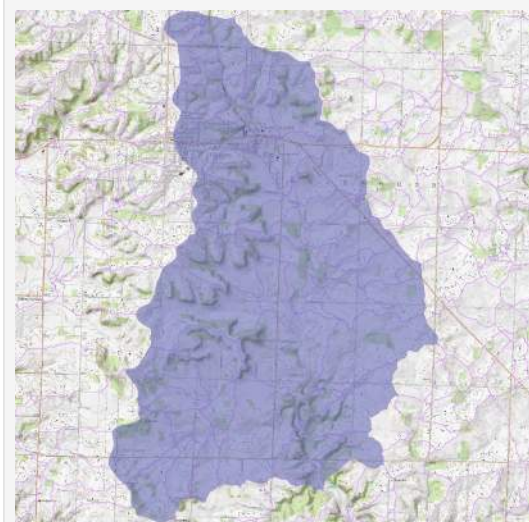
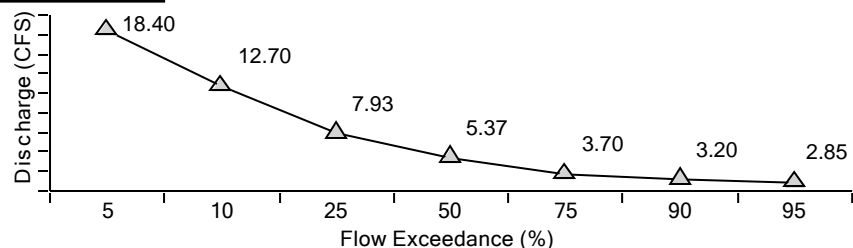
Waterbody Name: Isabelle Creek

HUC08: Rush-Vermillion

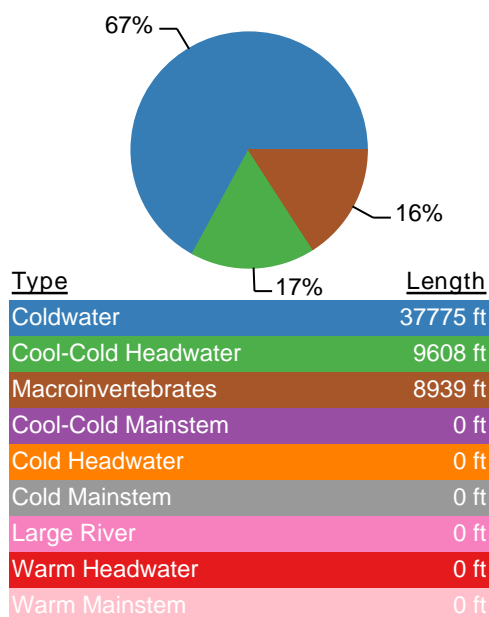
Watershed Area: 15.92 mi<sup>2</sup>

Average Annual Precipitation: 31.89in

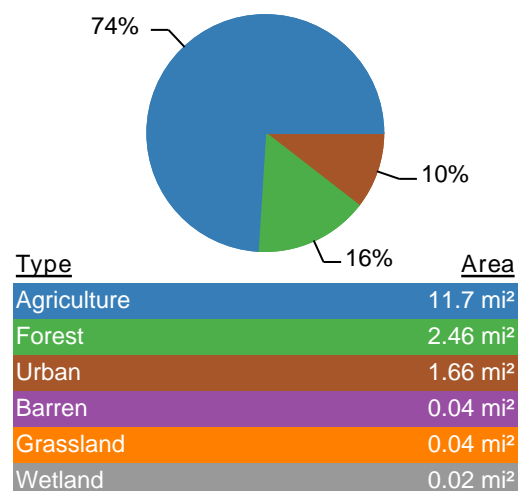
## Stream Flow



## Tributary Stream Type



## Landcover



## PRESTO Phosphorus Load Estimate

Avg. Annual Nonpoint Phosphorous Load (80% Confidence Interval)	9,971 (4,233 - 23,488) lbs
Number of Facilities (Individual Facility Information below)	2
Avg. Annual Point-source Phosphorous Load (2010 - 2012 total of all facilities)	1,710lbs
Most Likely Point : Nonpoint Phosphorous Ratio	15% : 85%
Low Estimate Point : Nonpoint Phosphorous Ratio (Adaptive Management)	7% : 93%

## Adaptive Management Results

Facilities Discharging to the Isabelle Creek Watershed:

Facility Name	Permit #	Outfall #	Waste Type	Receiving Water	Avg. Phosphorus Load (lbs.) (2010 - 2012)
ELLSWORTH COOP CREAMERY	0022942	001	Industrial	Isabelle Creek	987
ELLSWORTH WASTEWATER TREATMENT FACILITY	0021253	001	Municipal	Isabelle Creek	723



### Watershed Analysis Limitations

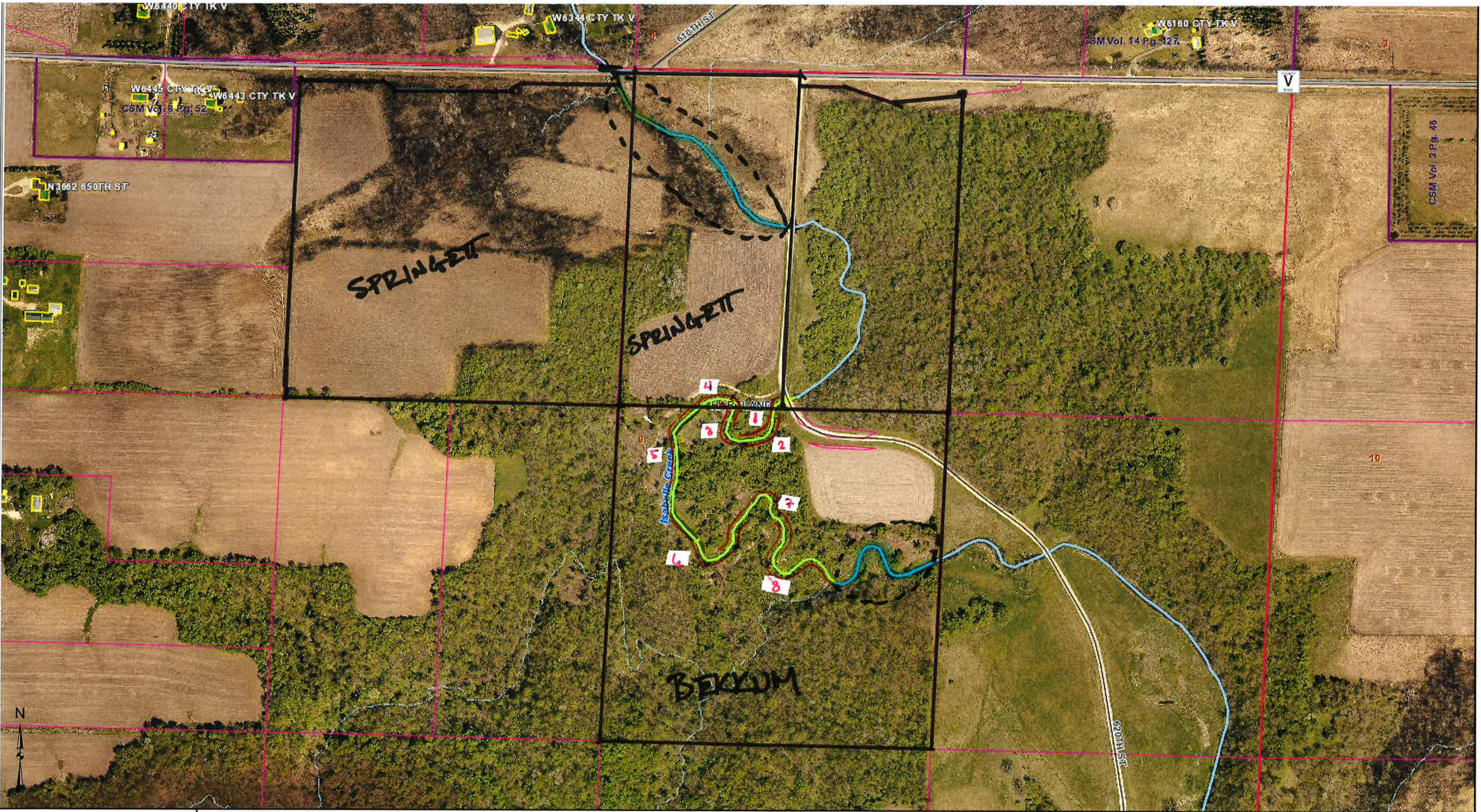
- This analysis relies on pre-defined catchments from the Wisconsin Hydrography Data-Plus and may not delineate from the exact location required. When assessing phosphorus loads for specific facility in support of efforts such as adaptive management, care should be taken to ensure that additional downstream point sources do not exist. For adaptive management information related to specific facilities please reference the PRESTO website <http://dnr.wi.gov/topic/surfacewater/presto.html>
- Delineation of watersheds is based on a topographic assessment and therefore do not account for modified drainage networks such as stormwater sewer systems and ditched agriculture.
- If a watershed requires delineation from an exact location the user may use the desktop version of PRESTO that requires ESRI ArcGIS. The PRESTO tool and default datasets can be downloaded at <http://dnr.wi.gov/topic/surfacewater/presto.html>
- Data sources for this report originate from the WDNR's Wisconsin Hydrography Data-Plus value-added dataset and the point and non-point source loading information including in the WDNR's PRESTO model.
- If you have questions about the report generated from the PRESTO-Lite application please contact: [DNRWATERQUALITYMODELING@wisconsin.gov](mailto:DNRWATERQUALITYMODELING@wisconsin.gov)

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**APPENDIX 3-1**

**SOIL SAMPLE SITE MAPS**





These data are provided on an "AS-IS" basis, without warranty of any type, expressed or implied, including but not limited to any warranty as to their performance, merchantability, or fitness for any particular purpose.

1:4,216	Date: 12/17/2020
This map is not a substitute for accurate field surveys or for locating actual property lines and any adjacent features.	



Pierce  
County  
Wisconsin



**APPENDIX 4-1**

**SEGMENT PHOTOS**

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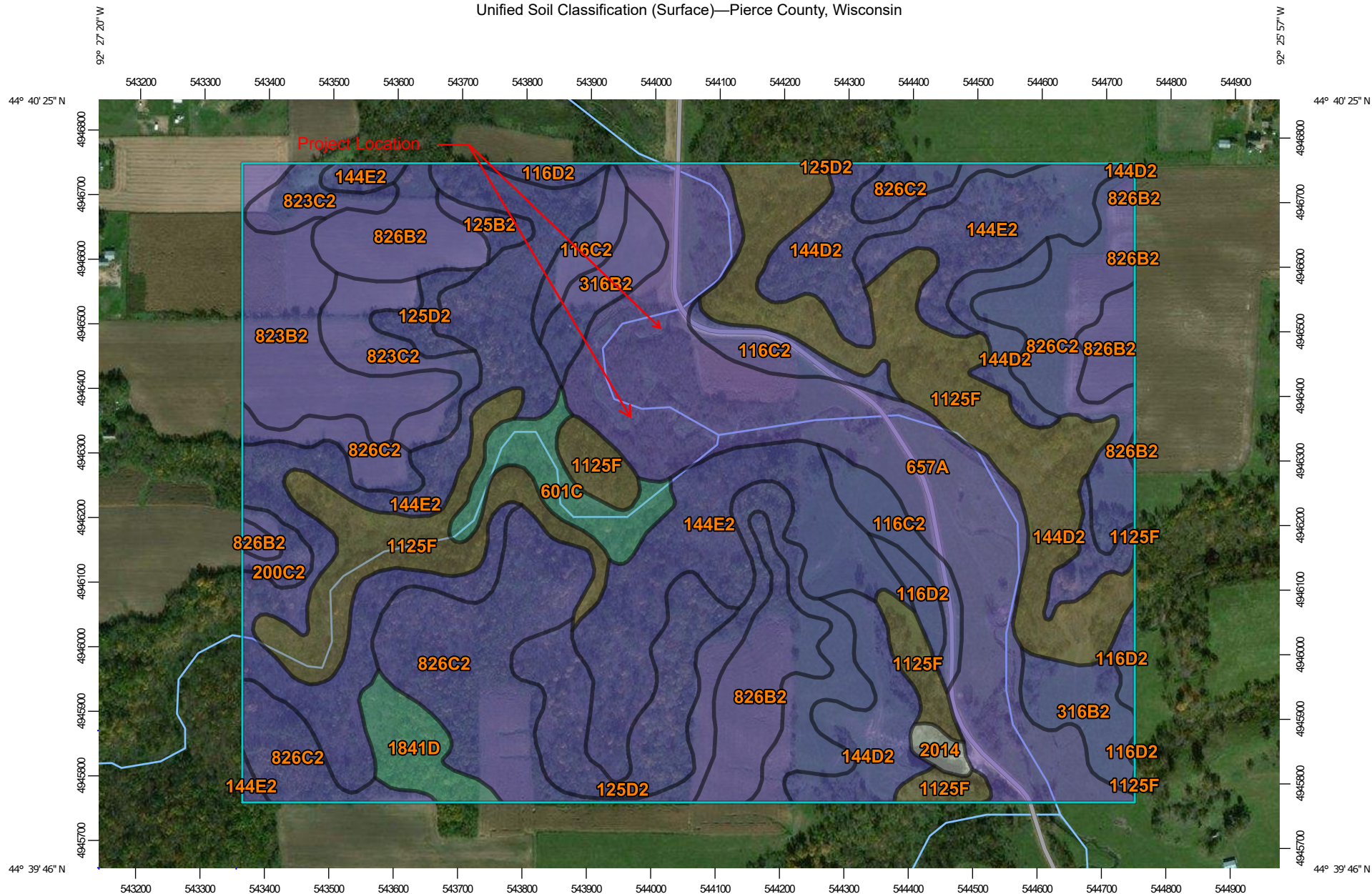
**APPENDIX 4-2**

**STREAMBANK SOILS MAP**

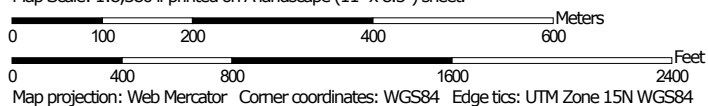
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# Unified Soil Classification (Surface)—Pierce County, Wisconsin



Map Scale: 1:8,380 if printed on A landscape (11" x 8.5") sheet.



**Natural Resources  
Conservation Service**

Web Soil Survey  
National Cooperative Soil Survey

11/30/2020  
Page 1 of 5

## MAP LEGEND

### Area of Interest (AOI)

Area of Interest (AOI)

### Soils

#### Soil Rating Polygons

	CH
	CL
	CL-A (proposed)
	CL-K (proposed)
	CL-ML
	CL-O (proposed)
	CL-T (proposed)
	GC
	GC-GM
	GM
	GP
	GP-GC
	GP-GM
	GW
	GW-GC
	GW-GM
	MH
	MH-A (proposed)
	MH-K (proposed)
	MH-O (proposed)
	MH-T (proposed)
	ML

	ML-A (proposed)
	ML-K (proposed)
	ML-O (proposed)
	ML-T (proposed)
	OH
	OH-T (proposed)
	OL
	PT
	SC
	SC-SM
	SM
	SP
	SP-SC
	SP-SM
	SW
	SW-SC
	SW-SM
	Not rated or not available

#### Soil Rating Lines

	CH
	CL
	CL-A (proposed)
	CL-K (proposed)
	CL-ML
	CL-O (proposed)
	CL-T (proposed)
	GC
	GC-GM
	GM
	GP
	GP-GC
	GP-GM
	GW
	GW-GC
	GW-GM
	MH
	MH-A (proposed)
	MH-K (proposed)
	MH-O (proposed)
	MH-T (proposed)
	ML
	ML-A (proposed)
	ML-K (proposed)
	ML-O (proposed)
	ML-T (proposed)
	OH
	OH-T (proposed)
	OL
	PT
	SC
	SC-SM
	SM

	SP
	SP-SC
	SP-SM
	SW
	SW-SC
	SW-SM
	Not rated or not available

#### Soil Rating Points

	CH
	CL
	CL-A (proposed)
	CL-K (proposed)
	CL-ML
	CL-O (proposed)
	CL-T (proposed)
	GC
	GC-GM
	GM
	GP
	GP-GC
	GP-GM
	GW
	GW-GC
	GW-GM
	MH
	MH-A (proposed)

	MH-K (proposed)
	MH-O (proposed)
	MH-T (proposed)
	ML
	ML-A (proposed)
	ML-K (proposed)
	ML-O (proposed)
	ML-T (proposed)
	OH
	OH-T (proposed)
	OL
	PT
	SC
	SC-SM
	SM
	SP
	SP-SC
	SP-SM
	SW
	SW-SC
	SW-SM
	Not rated or not available

#### Water Features





Streams and Canals

#### Transportation


Rails



## MAP INFORMATION

-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

### Background

-  Aerial Photography

### Area of interest

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pierce County, Wisconsin

Survey Area Data: Version 20, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 4, 2010—Jun 6, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Unified Soil Classification (Surface)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
116C2	Churchtown silt loam, 6 to 12 percent slopes, moderately eroded	CL	11.2	3.3%
116D2	Churchtown silt loam, 12 to 20 percent slopes, moderately eroded	CL	4.1	1.2%
125B2	Pepin silt loam, 2 to 6 percent slopes, moderately eroded	CL	1.5	0.5%
125D2	Pepin silt loam, 12 to 20 percent slopes, moderately eroded	CL	14.7	4.3%
144D2	Newglarus silt loam, deep, 12 to 20 percent slopes, moderately eroded	CL	22.4	6.6%
144E2	Newglarus silt loam, deep, 20 to 30 percent slopes, moderately eroded	CL	64.1	18.8%
200C2	Hixton loam, till plain, 6 to 12 percent slopes, moderately eroded	CL	1.8	0.5%
316B2	Ella silt loam, 1 to 6 percent slopes, moderately eroded	CL	10.2	3.0%
601C	Beavercreek cobbly fine sandy loam, 3 to 12 percent slopes, occasionally flooded	SC-SM	6.9	2.0%
657A	Dunnbot silt loam, 0 to 3 percent slopes, occasionally flooded	CL-ML	48.1	14.1%
823B2	Whalan silt loam, 2 to 6 percent slopes, moderately eroded	CL	14.0	4.1%
823C2	Whalan silt loam, 6 to 12 percent slopes, moderately eroded	CL	9.9	2.9%
826B2	Hersey silt loam, 2 to 6 percent slopes, moderately eroded	CL	19.8	5.8%
826C2	Hersey silt loam, 6 to 12 percent slopes, moderately eroded	CL	55.5	16.3%



Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1125F	Dorerton, very stony-Elbaville complex, 30 to 60 percent slopes	ML	50.0	14.7%
1841D	Lilah-Wykoff complex, 12 to 20 percent slopes	SC-SM	5.2	1.5%
2014	Pits, quarry, hard bedrock		1.2	0.4%
<b>Totals for Area of Interest</b>			<b>340.4</b>	<b>100.0%</b>

## Description

The Unified soil classification system classifies mineral and organic mineral soils for engineering purposes on the basis of particle-size characteristics, liquid limit, and plasticity index. It identifies three major soil divisions: (i) coarse-grained soils having less than 50 percent, by weight, particles smaller than 0.074 mm in diameter; (ii) fine-grained soils having 50 percent or more, by weight, particles smaller than 0.074 mm in diameter; and (iii) highly organic soils that demonstrate certain organic characteristics. These divisions are further subdivided into a total of 15 basic soil groups. The major soil divisions and basic soil groups are determined on the basis of estimated or measured values for grain-size distribution and Atterberg limits. ASTM D 2487 shows the criteria chart used for classifying soil in the Unified system and the 15 basic soil groups of the system and the plasticity chart for the Unified system.

The various groupings of this classification correlate in a general way with the engineering behavior of soils. This correlation provides a useful first step in any field or laboratory investigation for engineering purposes. It can serve to make some general interpretations relating to probable performance of the soil for engineering uses.

For each soil horizon in the database one or more Unified soil classifications may be listed. One is marked as the representative or most commonly occurring. The representative classification is shown here for the surface layer of the soil.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Lower

*Layer Options (Horizon Aggregation Method):* Surface Layer (Not applicable)

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## **APPENDIX 5-1**

### **RECESSION RATES & PHOSPHORUS LOSS CALCULATIONS**

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# Lateral Recession Rates

## Streambank Erosion

Lateral Recession Rate (ft/yr)	Ave. (ft/yr)	Category	Description
0.01 - 0.05	0.03	Slight	Some bare bank but active erosion not readily apparent. No vegetative overhang. No exposed tree roots. Bank height minimal.
0.06 - 0.2	0.13	Moderate	Bank is predominantly bare with some vegetative overhang. Some exposed tree roots. No slumping evident.
0.3 - 0.5	0.40	Severe	Bank is bare with very noticeable vegetative overhang. Many tree roots exposed and some fallen trees. Slumping or rotational slips are present. Some changes in cultural features, such as missing fence posts and realignment of roads.
0.5 - 2.0	1.5	Very Severe	Bank is bare and vertical or nearly vertical. Soil material has accumulated at base of slope or in water. Many fallen trees and/or extensive vegetative overhang. Cultural features exposed or removed or extensively altered. Numerous slumps or rotational slips present. Generally silty or sandy bank material, NOT glacial till or exposed shale bedrock.
2.0 - 5.0	3.5	Extremely Severe	Bank is bare and vertical. Soil material has accumulated at base of slope and oftentimes still contains living grass or other vegetative material. Extensive cracking of the earth parallel to the exposed face above the bank. Generally evidence of "block-size" material that has either recently fallen in or is about to fall in. Can be "pillars" of soil materials that have already been loosened by stream and indicate imminent failure into the stream. Trees have been undercut and lie in stream, often with root balls intact. Silty or sandy bank material, NOT glacial till or exposed shale bedrock. (These rates should be verified with several observations or with actual streambank monitoring.)

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**NRCS Streambank and Irrigation Ditch Erosion Estimator (Direct Volume Method)**

Farmer / Cooperator Name:   
 Tract Number:

Evaluated By:   
 Evaluation Date:

Field Number	Eroding Strmbnk Reach #; or Ditch Side/Bottom	Eroding Bank or Ditch Length (Feet)	Eroding Bank Height; or Ditch Bottom Width* (Feet)	Area of Eroding Strmbank or Ditch (FT <sup>2</sup> )	Lateral or Ditch Bottom Recession Rate (Estimated) (FT / Year)	Estimated Volume (FT <sup>3</sup> ) Eroded Annually	Soil Texture	Approximate Pounds of Soil per FT <sup>3</sup>	Estimated Soil Loss (Tons/Year)
	1N	275.0	6.0	1,650	0.50	825.0	Loamy Sand	100	41.3
Total Estimated Annual Streambank or Ditch Erosion Soil Loss (Tons):									41.3
Percent Leachable Phosphorus in the Soil (nitric/peroxide):									0.04%
Total Estimated Annual Streambank or Ditch Erosion Phosphorus Loss (Tons):									0.017
<b>Total Estimated Annual Streambank or Ditch Erosion Phosphorus Loss (lbs):</b>									<b>33</b>

Field Number	Eroding Strmbnk Reach #; or Ditch Side/Bottom	Eroding Bank or Ditch Length (Feet)	Eroding Bank Height; or Ditch Bottom Width* (Feet)	Area of Eroding Strmbank or Ditch (FT <sup>2</sup> )	Lateral or Ditch Bottom Recession Rate (Estimated) (FT / Year)	Estimated Volume (FT <sup>3</sup> ) Eroded Annually	Soil Texture	Approximate Pounds of Soil per FT <sup>3</sup>	Estimated Soil Loss (Tons/Year)
	3S	230.0	6.0	1,380	0.50	690.0	Loamy Sand	100	34.5
	4N	360.0	14.0	5,040	0.50	2,520.0	Loamy Sand	100	126.0
	7N	510.0	5.0	2,550	0.50	1,275.0	Loamy Sand	100	63.8
	8S	520.0	4.0	2,080	0.50	1,040.0	Loamy Sand	100	52.0
Total Estimated Annual Streambank or Ditch Erosion Soil Loss (Tons):									276.3
Percent Leachable Phosphorus in the Soil (nitric/peroxide):									0.05%
Total Estimated Annual Streambank or Ditch Erosion Phosphorus Loss (Tons)									0.138
<b>Total Estimated Annual Streambank or Ditch Erosion Phosphorus Loss (lbs):</b>									<b>276</b>



Field Number	Eroding Strmbnk Reach #; or Ditch Side/Bottom	Eroding Bank or Ditch Length (Feet)	Eroding Bank Height; or Ditch Bottom Width* (Feet)	Area of Eroding Strmbank or Ditch (FT <sup>2</sup> )	Lateral or Ditch Bottom Recession Rate (Estimated) (FT / Year)	Estimated Volume (FT <sup>3</sup> ) Eroded Annually	Soil Texture	Approximate Pounds of Soil per FT <sup>3</sup>	Estimated Soil Loss (Tons/Year)
	2S	220.0	6.0	1,320	0.50	660.0	Loamy Sand	100	33.0
	6S	450.0	5.0	2,250	0.50	1,125.0	Loamy Sand	100	56.3
Total Estimated Annual Streambank or Ditch Erosion Soil Loss (Tons):									89.3
Percent Leachable Phosphorus in the Soil (nitric/peroxide):									0.06%
Total Estimated Annual Streambank or Ditch Erosion Phosphorus Loss (Tons)									0.054
<b>Total Estimated Annual Streambank or Ditch Erosion Phosphorus Loss (lbs):</b>									<b>107</b>

Field Number	Eroding Strmbnk Reach #; or Ditch Side/Bottom	Eroding Bank or Ditch Length (Feet)	Eroding Bank Height; or Ditch Bottom Width* (Feet)	Area of Eroding Strmbank or Ditch (FT <sup>2</sup> )	Lateral or Ditch Bottom Recession Rate (Estimated) (FT / Year)	Estimated Volume (FT <sup>3</sup> ) Eroded Annually	Soil Texture	Approximate Pounds of Soil per FT <sup>3</sup>	Estimated Soil Loss (Tons/Year)
	5N	410.0	7.0	2,870	0.50	1,435.0	Loamy Sand	100	71.8
Total Estimated Annual Streambank or Ditch Erosion Soil Loss (Tons):									71.8
Percent Leachable Phosphorus in the Soil (nitric/peroxide):									0.07%
Total Estimated Annual Streambank or Ditch Erosion Phosphorus Loss (Tons)									0.050
<b>Total Estimated Annual Streambank or Ditch Erosion Phosphorus Loss (lbs):</b>									<b>100</b>

**Total Phosphorus Loss for sum of reaches (lbs/yr):**

**517**

Required 3:1 1,769

Required 2:1 1,179

\* Eroding bank height is measured along the bank, not the vertical height of bank.

*Streambank or Ditch Erosion Calculation Formula:*

Eroding Bank/Ditch Length X Eroding Bank Ht or Ditch Bottom Width X Lateral or Ditch Bottom Recession Rate (FT/YR) X Soil Weight (lbs/ft<sup>3</sup>)

Estimated Soil Loss  
= Per Year (Tons)

2000

## **APPENDIX 6-1**

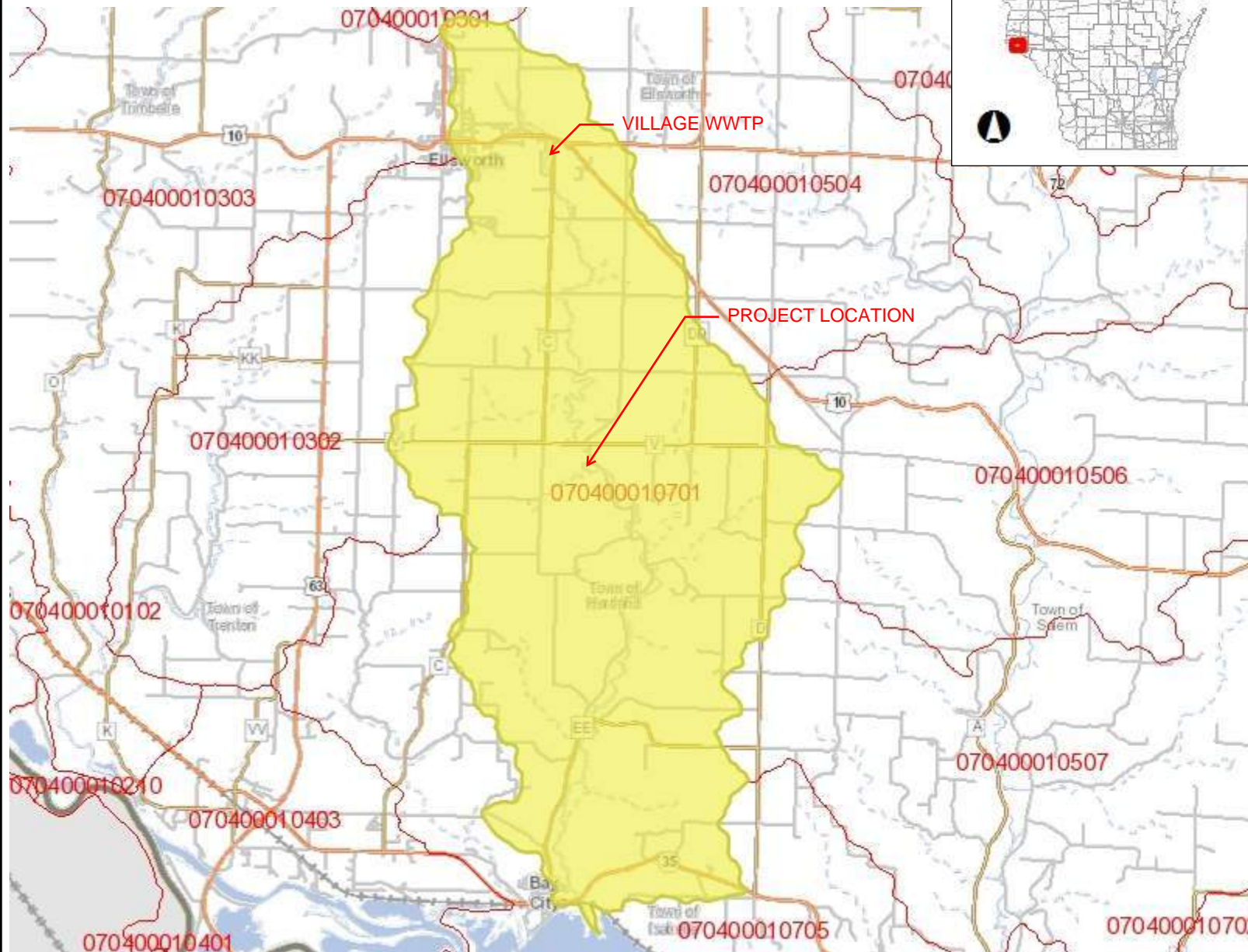
### **HUC 12 WATERSHED BASIN**

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# Surface Water Data Viewer Map



## Legend

- 12-digit HUCs (Subwatersheds)
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Lakes and Open water

## Notes

HUC 12  
Isabelle Creek

4.0 0 2.00 4.0 Miles

NAD\_1983\_HARN\_Wisconsin\_TM

1: 126,720

DISCLAIMER: The information shown on these maps has been obtained from various sources, and are of varying age, reliability and resolution. These maps are not intended to be used for navigation, nor are these maps an authoritative source of information about legal land ownership or public access. No warranty, expressed or implied, is made regarding accuracy, applicability for a particular use, completeness, or legality of the information depicted on this map. For more information, see the DNR Legal Notices web page: <http://dnr.wi.gov/legal/>

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**APPENDIX 7-1**

**DRAFT WQT AGREEMENTS**



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# Water Quality Trading Agreement: Village of Ellsworth and Matthew Bekkum

## Permittee Information

Credit User Name (Permittee) Village of Ellsworth	Permit Number WI-0021253-09-0
--	----------------------------------

## Credit User Address

130 N Chestnut St., Ellsworth, WI 54011

Broker Name Pierce County Land Conservation Division	Trade Agreement Number WQT-64998020-02
---	---

## Broker Address

Street Address Pierce Co. Office Bldg., 412 W. Kinne St.	City Ellsworth	State WI	ZIP Code 54011
---	-------------------	-------------	-------------------

## Project Name

Isabelle Creek Streambank Improvements – Bekkum/Springett

## Name of Credit Generator (Landowner/Operator) (Last, First, M.I.)

Matthew Bekkum

Street Address 8384 Allegheny Grove Blvd	City Victoria	State MN	ZIP Code 55386
---	------------------	-------------	-------------------

## Property Information

### Name of Landowner(s) (if not Operator) (Last, First, M.I.)

Street Address	City	State	ZIP Code
----------------	------	-------	----------

Legal Description of Property - Contiguous sites under the same ownership: (add additional sheets if necessary)

SW 1/4 OF NE 1/4 EX HWY CONVEYANCE OF .31 ACRES TOGETHER WITH EASEMENT OVER S 200 FT OF NW 1/4 OF NE 1/4 LYG W OF 620TH ST PER V 336 P 291

## Parcel ID(s):

012-01021-0600

## Site Locator for Construction Projects

County	Township	Range	E / W	Section	Quarter/Quarter (e.g., NW ¼ of the NE ¼)
Pierce County	25N	17W		9	SW1/4 of the NE 1/4
	N				
	N				
	N				

## Agreement

The property described above is enrolled in a Water Quality Trade Agreement. Funds are provided by the **Credit User** in return for the installation (by the **Broker**), operation and maintenance (by the landowner) of best management practices (BMPs) designed to enhance water quality. This agreement commits the landowner/operator, their heirs, successors and assigns to fulfill the trade agreement until a satisfaction or release is filed by the credit user.

**Addenda which describe the BMPs, costs, installation schedule, and conditions are hereby incorporated into this agreement and are on file with the credit user and may be given to Wisconsin DNR upon request by the Department.**

**Landowner/Operator**

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 21.

\_\_\_\_\_  
Signature of Operator

\_\_\_\_\_  
Signature of Landowner/Operator

Matthew Bekkum, Operator/Landowner  
Typed Name of Operator

\_\_\_\_\_  
Typed Name of Landowner/Operator

STATE OF WISCONSIN

\_\_\_\_\_ County

)  
)  
) ss.  
)  
)

Personally came before me this \_\_\_\_\_ day of \_\_\_\_\_, 2021.

The above named \_\_\_\_\_ to me known to be  
the person(s) who executed the foregoing instrument and acknowledge the same.

\_\_\_\_\_  
Signature of Notary Public

\_\_\_\_\_  
Typed Name of Notary Public

Notary Public \_\_\_\_\_ County, Wisconsin

My commission (is permanent) ( expires \_\_\_\_\_ ).

**Landowners (if not operator)**

If the landowner section is not completed, check (X) one or both of the following that apply

☐ Landowner is also operator

☐ Trade agreement contains only high residue management, nutrient management, pesticide management, cropland protection cover (green manure)

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

\_\_\_\_\_  
Signature of Landowner (if not operator)

\_\_\_\_\_  
Signature of Landowner (if not operator)

\_\_\_\_\_  
Typed Name of Landowner (if not operator)

\_\_\_\_\_  
Typed Name of Landowner (if not operator)

STATE OF WISCONSIN

\_\_\_\_\_ County

)  
)  
) ss.  
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)

Personally came before me this \_\_\_\_\_ day of \_\_\_\_\_, 20 21.

The above named \_\_\_\_\_ to me known to be  
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\_\_\_\_\_  
Signature of Notary Public

\_\_\_\_\_  
Typed Name of Notary Public

Notary Public \_\_\_\_\_ County, Wisconsin

My commission (is permanent) ( expires \_\_\_\_\_ ).

**Credit User**

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 21.

\_\_\_\_\_  
Signature of credit user

Village of Ellsworth

\_\_\_\_\_  
Typed Name of credit user/broker/exchange

STATE OF WISCONSIN

\_\_\_\_\_ County

)  
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\_\_\_\_\_  
Signature of Notary Public

Notary Public \_\_\_\_\_ County, Wisconsin

My commission (is permanent) ( expires \_\_\_\_\_ ).



Other Signer- Specify title or relationship: Pierce County Dept. of Land Conservation – Broker

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 21.

Signature

Signature

Rodney Webb, Director, Land Conservation Dept.  
Typed Name

Typed Name

STATE OF WISCONSIN

Pierce County

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) ss.  
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Signature of Notary Public

Typed Name of Notary Public

Notary Public Pierce County, Wisconsin

My commission (is permanent) ( expires \_\_\_\_\_ ).

Other Signer- Specify title or relationship: \_\_\_\_\_

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

Signature

Signature

Typed Name

Typed Name

STATE OF WISCONSIN

\_\_\_\_\_ County

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Signature of Notary Public

Typed Name of Notary Public

Notary Public \_\_\_\_\_ County, Wisconsin

My commission (is permanent) ( expires \_\_\_\_\_ ).

Other Signer- Specify title or relationship: \_\_\_\_\_

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

Signature

Signature

Typed Name

Typed Name

STATE OF WISCONSIN

\_\_\_\_\_ County

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Signature of Notary Public

Typed Name of Notary Public

Notary Public \_\_\_\_\_ County, Wisconsin

My commission (is permanent) ( expires \_\_\_\_\_ ).

☐ Check this box if this page is purposely left blank.

## Section A – General Requirements

1. The following relationship has been established for this Water Quality Trading Agreement:
  - The **Village of Ellsworth** is the **Credit User**.
  - The **Pierce County Land Conservation Division** is the **Broker**.
  - **Matthew Bekkum** is the **Landowner/Operator**.
2. **Credit User** will hereby be responsible for all or **100%** of monetary costs incurred with the BMP practice installation, which includes but is not limited to; site preparation, clearing, and finished planned grades; stream shaping; limestone rock riprap and installation; liming, fertilizing, seeding and mulching. The **Credit User** shall have the right to access the property for inspection or maintenance.
3. The **Credit User** reserves the right to terminate this agreement if the Wisconsin Department of Natural Resources (DNR) does NOT approve the Water Quality Trading Plan (WQT Plan). The WQT identifies this project for **517 phosphorus credits** to replace phosphorus reduction that is done at the **Credit User's** wastewater treatment facility (WWTF) and comply with the Ellsworth WPDES phosphorus limit. The credits will be described in the WQT Watershed Plan and reviewed by the Department of Natural Resources (WDNR). Should the DNR either deny or reduce the project credits which results in a higher cost per pound of phosphorus credit, then the **Credit User** may terminate the agreement.
4. The **Broker** will be responsible for the oversight of the BMP practice design, contractor bidding process and signed contracts for construction, inspection of site preparation and installation, regulation of applicable performance standards, and monitoring of landowners' obligations in the form of performing on-site checks as needed and as stated in Section B. The **Broker** shall not have any financial obligation for this project except as expressly stated in this agreement. The **Broker** reserves the right to enter the property to verify the information on the inspection report is accurate.
5. The **Credit User** shall defend, indemnify and hold the **Broker**, its officers, officials, employees and volunteers harmless from any and all claims, injuries, damages, losses or suits including attorney fees, arising out of or in connection with the performance of this Agreement, except for injuries and damages caused by the negligence of the **Broker**.
6. This agreement may be amended, by written mutual agreement of the parties, during the installation or maintenance period, if the proposed changes will provide equal or greater control of water pollution. For any changes in practice components or costs, the **Broker** will determine eligibility and whether to approve such changes. Any increases to the project cost shall be approved in advance in writing by the **Credit User**.
7. This contract will be recorded in the Pierce County Register of Deeds office.
8. Any duly authorized officer, employee or representative of WDNR shall have the right to access and inspect the practices pursuant to Wis. Stat. 283.55(2) so long as this Agreement remains in effect.

## Section B – Landowner/Operator:

1. Check for sloughing, erosion, or damage to vegetative cover. Damaged areas shall be graded, shaped, and replanted by **Landowner** as soon as possible with a seed mix pre-approved by the **Broker**.
2. Ensure that debris is removed from the channel and that vegetation is controlled around the channel only when the vegetation or obstructions are threatening stream function. Invasive vegetation should be controlled, and channel obstructions deemed harmful may be removed. Channel clearing to remove stumps, fallen trees, debris, and sediment bars shall only be performed when they are causing or could cause unacceptable bank erosion, flow restriction, or damage to structures. Habitat forming elements that provide cover, food, pools, and water turbulence shall be retained or replaced to the extent possible.
3. Inspect riprap annually and after heavy storms for any erosion or displacement of rocks. The **Broker** should be contacted immediately and directly if any damage has occurred. Cost of repairs will be shared among all parties of the agreement, to be determined after **Broker** determines cause, extent, and costs to repair. If the parties cannot mutually agree to who or what is responsible, the costs for complete repair will be split **50%** between each party, **Credit User and Landowner**.
4. Ensure that no grazing of animals will occur within 30 feet of the stream channel to prevent clogging or rerouting of water in the channel.
5. Periodically, mow vegetative buffer to control weeds and invading brush. All farm equipment and row crops must remain outside of the agreed upon 30-foot vegetated buffer from the top of the bank.
6. Eliminate all burrowing rodents and repair damage caused by them.
7. Maintain the project consistent with NRCS technical standard 580.
8. Installation of this practice allows the **Landowner** to comply with the applicable state/local performance standard. Compliance with this performance standard shall be for a period of 20 years. This practice must be maintained or replaced with a practice which ensures continued compliance with the applicable performance standard.
9. If any land covered by this agreement is transferred or otherwise changes ownership, this agreement will be held in obligation with the land for the full 20 years and the new owners will be obligated to comply with this agreement. **Landowners** are obligated to notify any prospective buyers of this agreement and their responsibilities under this agreement and applicable law.
10. The **Landowners** agree to repay all project costs to the **Credit User**, upon demand by the **Broker**, if the **Landowner** fails to comply with the terms of this agreement. Repayment shall not be required if a practice(s) is rendered ineffective by circumstances which are beyond the control of the **Landowner**.
11. The **Landowner** agrees that the annual inspections are to be performed on inspection forms, which will be provided by the **Broker**. The landowner will be required to take pictures of the BMP for the annual report, which will be submitted with the inspection form to the **Broker**. The **Landowner** agrees to submit the annual inspection and pictures by **September 30th** each year. Should the **Landowner** fail to submit the annual inspection to the **Broker** within 30 days of the due date, then the **Broker** may enter the **Landowner's** property to perform the inspection. Should the **Broker** need to perform the inspection due to failure of the **Landowner** to submit the inspection, then the **Landowner** will be responsible for a **\$250 inspection fee** payable to the **Broker**.

TA Number	Typed Name of Landowner/Operator	Initials of Landowner/Operator	Date
	Matthew Bekkum		

The cost-share recipient shall implement and maintain all best management practices listed in this Addendum, unless otherwise amended in accordance with this agreement.							Installation Period			
							From (MM/YY) 07/21		To (MM/YY) 9/21	
Field #	DNR BMP Code	Practice Name	Quantity	Unit	Unit Cost	Estimated Total Cost	Reimbursement Rate (%)	Estimated Cost-Share Amount	Cost-Share Amt. From Other Programs*	Estimated Year to be Installed
	NRCS 580	Mobilization	1	L.S.	\$ 5000.00	\$				2021
	NRCS 580	Site Preparation, clearing, and grading	1	L.S.	\$ 3000.00	\$				2021
	NRCS 580	Limestone rock riprap D50 size 8" Diameter		cu. yd.	\$ 50.00	\$				2021
	NRCS 580	Geotextile Fabric, Type SAS		sq. yd.	\$ 3.00	\$				2021
	NRCS 580	Liming, fertilizing, seeding and mulching		sq. yd.	\$ 5.00	\$				2021
	NRCS 580	Erosion Control		L.F	\$ 2.30	\$				2021
		Sub-Total				\$				
		Contingencies (10%)				\$				
Note: These estimates are based on an overall project of three parcels of land. The estimated values were broken up through an assumed percentage of land. The exact values in the field may differ from above. * Identify Program Names:										
						TOTALS	\$	\$ -	\$ -	\$ -
CSA Number		Typed Name of Landowner / Operator Matthew Bekkum				Initials of Landowner/Operator			Date	



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# Water Quality Trading Agreement: Village of Ellsworth and Thomas & Theresa Springett

## Permittee Information

Credit User Name (Permittee) Village of Ellsworth	Permit Number WI-0021253-09-0
--	----------------------------------

## Credit User Address

130 N Chestnut St., Ellsworth, WI 54011

Broker Name Pierce County Land Conservation Division	Trade Agreement Number WQT-64998020-02
---	---

## Broker Address

Street Address Pierce Co. Office Bldg., 412 W. Kinne St.	City Ellsworth	State WI	ZIP Code 54011
---	-------------------	-------------	-------------------

## Project Name

Isabelle Creek Streambank Improvements – Bekkum/Springett

## Name of Credit Generator (Landowner/Operator) (Last, First, M.I.)

Thomas & Theresa Springett

Street Address W5512 US Hwy 10	City Ellsworth	State WI	ZIP Code 54011
-----------------------------------	-------------------	-------------	-------------------

## Property Information

### Name of Landowner(s) (if not Operator) (Last, First, M.I.)

Street Address	City	State	ZIP Code
----------------	------	-------	----------

Legal Description of Property - Contiguous sites under the same ownership: (add additional sheets if necessary)

W ½ OF NW 1/4 OF NE 1/4 SUBJ TO EASEMENT OVER S 200 FT PER V 336 P 291

## Parcel ID(s):

012-01021-0500

## Site Locator for Construction Projects

County	Township	Range	E / W	Section	Quarter/Quarter (e.g., NW ¼ of the NE ¼)
Pierce County	25N	17W		9	NW1/4 of the NE 1/4
	N				
	N				
	N				

## Agreement

The property described above is enrolled in a Water Quality Trade Agreement. Funds are provided by the **Credit User** in return for the installation (by the **Broker**), operation and maintenance (by the landowner) of best management practices (BMPs) designed to enhance water quality. This agreement commits the landowner/operator, their heirs, successors and assigns to fulfill the trade agreement until a satisfaction or release is filed by the credit user.

**Addenda which describe the BMPs, costs, installation schedule, and conditions are hereby incorporated into this agreement and are on file with the credit user and may be given to Wisconsin DNR upon request by the Department.**

**Landowner/Operator**Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 21.\_\_\_\_\_  
Signature of Operator\_\_\_\_\_  
Signature of Landowner/Operator\_\_\_\_\_  
Thomas Springett, Operator/Landowner  
Typed Name of Operator\_\_\_\_\_  
Typed Name of Landowner/Operator

STATE OF WISCONSIN

\_\_\_\_\_  
County)  
)  
) ss.  
)  
)

Personally came before me this \_\_\_\_\_ day of \_\_\_\_\_, 2021.

The above named \_\_\_\_\_ to me known to be  
the person(s) who executed the foregoing instrument and acknowledge the same.\_\_\_\_\_  
Signature of Notary Public\_\_\_\_\_  
Typed Name of Notary Public

Notary Public \_\_\_\_\_ County, Wisconsin

My commission (is permanent) ( expires \_\_\_\_\_ ).

**Landowners (if not operator)**

If the landowner section is not completed, check (X) one or both of the following that apply

☐ Landowner is also operator☐ Trade agreement contains only high residue management, nutrient management, pesticide management, cropland protection cover (green manure)

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

\_\_\_\_\_  
Signature of Landowner (if not operator)\_\_\_\_\_  
Signature of Landowner (if not operator)\_\_\_\_\_  
Typed Name of Landowner (if not operator)\_\_\_\_\_  
Typed Name of Landowner (if not operator)

STATE OF WISCONSIN

\_\_\_\_\_  
County)  
)  
) ss.  
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)Personally came before me this \_\_\_\_\_ day of \_\_\_\_\_, 20 21.The above named \_\_\_\_\_ to me known to be  
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Signature of Notary Public\_\_\_\_\_  
Typed Name of Notary Public

Notary Public \_\_\_\_\_ County, Wisconsin

My commission (is permanent) ( expires \_\_\_\_\_ ).

**Credit User**Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 21.\_\_\_\_\_  
Signature of credit user\_\_\_\_\_  
Village of Ellsworth\_\_\_\_\_  
Typed Name of credit user/broker/exchange

STATE OF WISCONSIN

\_\_\_\_\_  
County)  
)  
) ss.  
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)Personally came before me this \_\_\_\_\_ day of \_\_\_\_\_, 20 21.The above named \_\_\_\_\_ to me known to be  
the person(s) who executed the foregoing instrument and acknowledge the same.\_\_\_\_\_  
Signature of Notary Public

Notary Public \_\_\_\_\_ County, Wisconsin

My commission (is permanent) ( expires \_\_\_\_\_ ).



Other Signer- Specify title or relationship: Pierce County Dept. of Land Conservation – Broker

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 21.

Signature

Signature

Rodney Webb, Director, Land Conservation Dept.  
Typed Name

Typed Name

STATE OF WISCONSIN

Pierce County

)  
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) ss.  
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)

Personally came before me this \_\_\_\_\_ day of \_\_\_\_\_, 20 21.

The above named \_\_\_\_\_ to me known to be  
the person(s) who executed the foregoing instrument and acknowledge the same.

Signature of Notary Public

Typed Name of Notary Public

Notary Public Pierce County, Wisconsin

My commission (is permanent) ( expires \_\_\_\_\_ ).

Other Signer- Specify title or relationship: \_\_\_\_\_

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

Signature

Signature

Typed Name

Typed Name

STATE OF WISCONSIN

\_\_\_\_\_ County

)  
)  
) ss.  
)  
)

Personally came before me this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

The above named \_\_\_\_\_ to me known to be  
the person(s) who executed the foregoing instrument and acknowledge the same.

Signature of Notary Public

Typed Name of Notary Public

Notary Public \_\_\_\_\_ County, Wisconsin

My commission (is permanent) ( expires \_\_\_\_\_ ).

Other Signer- Specify title or relationship: \_\_\_\_\_

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

Signature

Signature

Typed Name

Typed Name

STATE OF WISCONSIN

\_\_\_\_\_ County

)  
)  
) ss.  
)  
)

Personally came before me this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

The above named \_\_\_\_\_ to me known to be  
the person(s) who executed the foregoing instrument and acknowledge the same.

Signature of Notary Public

Typed Name of Notary Public

Notary Public \_\_\_\_\_ County, Wisconsin

My commission (is permanent) ( expires \_\_\_\_\_ ).

☐ Check this box if this page is purposely left blank.

## Section A – General Requirements

1. The following relationship has been established for this Water Quality Trading Agreement:
  - The **Village of Ellsworth** is the **Credit User**.
  - The **Pierce County Land Conservation Division** is the **Broker**.
  - **Thomas Springett** is the **Landowner/Operator**.
2. **Credit User** will hereby be responsible for all or **100%** of monetary costs incurred with the BMP practice installation, which includes but is not limited to; site preparation, clearing, and finished planned grades; stream shaping; limestone rock riprap and installation; liming, fertilizing, seeding and mulching. The **Credit User** shall have the right to access the property for inspection or maintenance.
3. The **Credit User** reserves the right to terminate this agreement if the Wisconsin Department of Natural Resources (DNR) does NOT approve the Water Quality Trading Plan (WQT Plan). The WQT identifies this project for **517 phosphorus credits** to replace phosphorus reduction that is done at the **Credit User's** wastewater treatment facility (WWTF) and comply with the Ellsworth WPDES phosphorus limit. The credits will be described in the WQT Watershed Plan and reviewed by the Department of Natural Resources (WDNR). Should the DNR either deny or reduce the project credits which results in a higher cost per pound of phosphorus credit, then the **Credit User** may terminate the agreement.
4. The **Broker** will be responsible for the oversight of the BMP practice design, contractor bidding process and signed contracts for construction, inspection of site preparation and installation, regulation of applicable performance standards, and monitoring of landowners' obligations in the form of performing on-site checks as needed and as stated in Section B. The **Broker** shall not have any financial obligation for this project except as expressly stated in this agreement. The **Broker** reserves the right to enter the property to verify the information on the inspection report is accurate.
5. The **Credit User** shall defend, indemnify and hold the **Broker**, its officers, officials, employees and volunteers harmless from any and all claims, injuries, damages, losses or suits including attorney fees, arising out of or in connection with the performance of this Agreement, except for injuries and damages caused by the negligence of the **Broker**.
6. This agreement may be amended, by written mutual agreement of the parties, during the installation or maintenance period, if the proposed changes will provide equal or greater control of water pollution. For any changes in practice components or costs, the **Broker** will determine eligibility and whether to approve such changes. Any increases to the project cost shall be approved in advance in writing by the **Credit User**.
7. This contract will be recorded in the Pierce County Register of Deeds office.
8. Any duly authorized officer, employee or representative of WDNR shall have the right to access and inspect the practices pursuant to Wis. Stat. 283.55(2) so long as this Agreement remains in effect.

## Section B – Landowner/Operator:

1. Check for sloughing, erosion, or damage to vegetative cover. Damaged areas shall be graded, shaped, and replanted by **Landowner** as soon as possible with a seed mix pre-approved by the **Broker**.
2. Ensure that debris is removed from the channel and that vegetation is controlled around the channel only when the vegetation or obstructions are threatening stream function. Invasive vegetation should be controlled, and channel obstructions deemed harmful may be removed. Channel clearing to remove stumps, fallen trees, debris, and sediment bars shall only be performed when they are causing or could cause unacceptable bank erosion, flow restriction, or damage to structures. Habitat forming elements that provide cover, food, pools, and water turbulence shall be retained or replaced to the extent possible.
3. Inspect riprap annually and after heavy storms for any erosion or displacement of rocks. The **Broker** should be contacted immediately and directly if any damage has occurred. Cost of repairs will be shared among all parties of the agreement, to be determined after **Broker** determines cause, extent, and costs to repair. If the parties cannot mutually agree to who or what is responsible, the costs for complete repair will be split **50%** between each party, **Credit User and Landowner**.
4. Ensure that no grazing of animals will occur within 30 feet of the stream channel to prevent clogging or rerouting of water in the channel.
5. Periodically, mow vegetative buffer to control weeds and invading brush. All farm equipment and row crops must remain outside of the agreed upon 30-foot vegetated buffer from the top of the bank.
6. Eliminate all burrowing rodents and repair damage caused by them.
7. Maintain the project consistent with NRCS technical standard 580.
8. Installation of this practice allows the **Landowner** to comply with the applicable state/local performance standard. Compliance with this performance standard shall be for a period of 20 years. This practice must be maintained or replaced with a practice which ensures continued compliance with the applicable performance standard.
9. If any land covered by this agreement is transferred or otherwise changes ownership, this agreement will be held in obligation with the land for the full 20 years and the new owners will be obligated to comply with this agreement. **Landowners** are obligated to notify any prospective buyers of this agreement and their responsibilities under this agreement and applicable law.
10. The **Landowners** agree to repay all project costs to the **Credit User**, upon demand by the **Broker**, if the **Landowner** fails to comply with the terms of this agreement. Repayment shall not be required if a practice(s) is rendered ineffective by circumstances which are beyond the control of the **Landowner**.
11. The **Landowner** agrees that the annual inspections are to be performed on inspection forms, which will be provided by the **Broker**. The landowner will be required to take pictures of the BMP for the annual report, which will be submitted with the inspection form to the **Broker**. The **Landowner** agrees to submit the annual inspection and pictures by **September 30th** each year. Should the **Landowner** fail to submit the annual inspection to the **Broker** within 30 days of the due date, then the **Broker** may enter the **Landowner's** property to perform the inspection. Should the **Broker** need to perform the inspection due to failure of the **Landowner** to submit the inspection, then the **Landowner** will be responsible for a **\$250 inspection fee** payable to the **Broker**.

TA Number	Typed Name of Landowner/Operator	Initials of Landowner/Operator	Date
	Thomas Springett		

The cost-share recipient shall implement and maintain all best management practices listed in this Addendum, unless otherwise amended in accordance with this agreement.							Installation Period			
							From (MM/YY) 07/21			To (MM/YY) 9/21
Field #	DNR BMP Code	Practice Name	Quantity	Unit	Unit Cost	Estimated Total Cost	Reimbursement Rate (%)	Estimated Cost-Share Amount	Cost-Share Amt. From Other Programs*	Estimated Year to be Installed
	NRCS 580	Mobilization	1	L.S.	\$ 5000.00	\$				2021
	NRCS 580	Site Preparation, clearing, and grading	1	L.S.	\$ 3000.00	\$				2021
	NRCS 580	Limestone rock riprap D50 size 8" Diameter		cu. yd.	\$ 50.00	\$				2021
	NRCS 580	Geotextile Fabric, Type SAS		sq. yd.	\$ 3.00	\$				2021
	NRCS 580	Liming, fertilizing, seeding and mulching		sq. yd.	\$ 5.00	\$				2021
	NRCS 580	Erosion Control		L.F	\$ 2.30	\$				2021
		Sub-Total				\$				
		Contingencies (10%)				\$				
Note: These estimates are based on an overall project of three parcels of land. The estimated values were broken up through an assumed percentage of land. The exact values in the field may differ from above.										
* Identify Program Names:					TOTALS					
					\$	\$	-	\$	-	\$
CSA Number	Typed Name of Landowner / Operator Thomas Springett					Initials of Landowner/Operator			Date	



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**APPENDIX 8-1**

**STREAMBANK SOIL ANALYSIS**

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**Village of Ellsworth, Greg Engeset**  
**130 N Chestnut Street**  
**Ellsworth WI 54011**  
**Isabelle Creek**

**Date** 11/30/2020  
**Account #** 559013  
**Report #** 4628

## **Soil Total Mineral Analysis**

<b>Sample ID</b>	<b>P %</b>
1N	0.04
2S	0.06
3S	0.05
4N	0.05
5N	0.07
6S	0.06
7N	0.05
8S	0.05

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## **APPENDIX 12-1**

**NRCS 580**



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# STREAMBANK AND SHORELINE PROTECTION

(Feet)  
Code 580

Natural Resources Conservation Service  
Conservation Practice Standard

## I. Definition

Treatment(s) used to stabilize and protect eroding banks of streams or constructed channels, and shorelines of lakes, reservoirs, or estuaries.

## II. Purposes

This standard may be applied as part of a conservation management system to support one or more of the following concerns.

- Limiting the loss of land and its potential impacts to utilities, roads, buildings, other facilities or cultural resources adjacent to streambanks or lake shorelines;
- Maintaining or restoring channel dimensions (width, depth), meander (sinuosity and meander geometry) and profile (slope, pools, riffles) allowing the channel to transport sediment and runoff without aggrading or degrading;
- Reducing sediment loads that cause degradation of habitat and water quality; and
- Improving or protecting recreation, fish and wildlife habitat, native biodiversity, and natural scenic beauty.

## III. Conditions Where Practice Applies

This practice applies to the toe and bank zones of streambanks of natural or constructed channels and shorelines of lakes, reservoirs, or estuaries where they are susceptible to erosion (see Figure 1). This standard applies to controlling erosion using *structural treatments*<sup>1</sup> often in combination with re-vegetation, *soil bioengineering*, or upland erosion control practices (see NRCS National Engineering Handbook (NEH), Part 650, Engineering Field Handbook (EFH), Chapter 16, Companion Document 580-1).

This standard does not apply to erosion problems on the open coastal shorelines of the Great Lakes or

similar areas of complexity not normally within the scope of the NRCS authority or expertise.

## IV. Federal, Tribal, State, and Local Laws

Users of this standard should be aware of potentially applicable federal, tribal, state, and local laws, rules, regulations, or permit requirements governing streambank and shoreline protection. This standard does not contain the text of federal, tribal, state, or local laws.

## V. Criteria

A management and site assessment of unstable streambank and shoreline sites shall be made in sufficient detail to identify the causes contributing to the instability (e.g., livestock access, watershed alterations or sediment production, water level fluctuations, boat-generated waves, etc.).

Note: An interdisciplinary team may be needed to deal with complex streambank or shoreline projects.

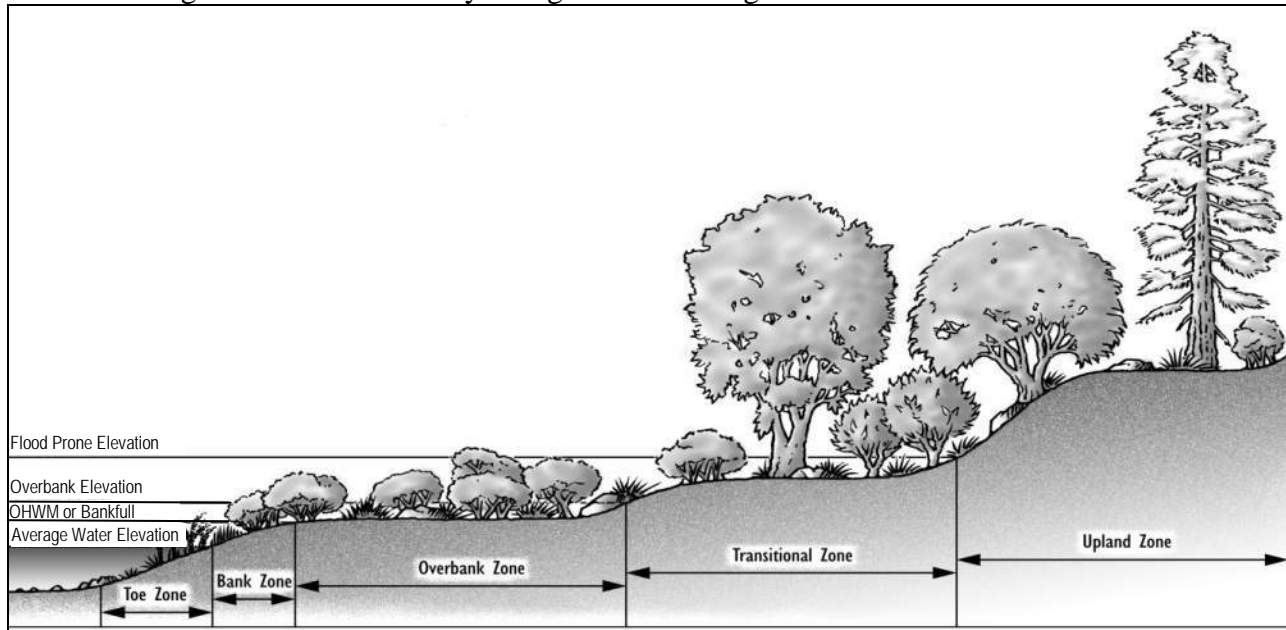
### A. Management Assessment, Streambanks and Shorelines

A management assessment of the site shall be conducted and incorporated into the design. The assessment shall be performed with the landowner to determine the purpose of the protection, available resources, and the existing and desired land uses and conditions. The management assessment shall include the following:

1. Land use and management (e.g., cropland, pasture, residential, recreation, fish and wildlife habitat).
2. Vegetation management – Desired conditions of aquatic, *littoral* (lakes), bank, and upland zones, and *access corridor*.

<sup>1</sup> Words in the standard that are shown in italics are described in X. Definitions. The words are italicized the first time they are used in the text.

Figure 1: Location of Hydrologic Zones Along a Streambank or Shoreline



Note: For the purposes of this standard the terms bankfull elevation and OHWM are deemed equivalent.

3. Access and use.
4. Watercraft use, restrictions, and potential impacts.
5. Willingness of landowner to carry out required maintenance.
6. Runoff and stormwater management.
7. Landowner's desired condition and plans for site.

#### B. Streambank Site Assessment

A site assessment shall be conducted and incorporated into the design. The assessment shall be performed to determine the physical, cultural, and historical site characteristics that will influence the construction, maintenance, and environmental integrity of the protection.

1. For all projects, the site assessment shall include:
  - a. Stream bed stability – Determination whether the stream bed is aggrading, degrading, or stable.
  - b. Hydrology and hydraulics, water level fluctuations, *bankfull elevation*, nearby

hydraulic structures (e.g., dams, bridges, culverts, storm sewer outfalls).

- c. Bank and bed composition – Soil type, composition, Unified Soil Classification System (USCS) profile log, streambed material.
  - d. Identification of the size and location of areas or habitats requiring avoidance (e.g., wetlands, riparian and upland areas, in-stream habitat).
  - e. Drainage paths, flow patterns, runoff controls, roof gutters, impervious areas.
  - f. Length of treatment area and accessibility for equipment.
  - g. Site sketch or checklist illustrating items V.B.1.a through f.
2. For single sites over 600 feet in length, or multiple sites in a ¼ mile reach totaling over 1,000 feet, assess items V.B.1.a through f, and the following items:
    - a. Determination whether the causes of instability are local (e.g., poor soils, seepage, alignment, obstructions deflecting flows into bank, etc.) or



- watershed related (e.g., aggradation due to increased sediment, increased runoff due to urban development, degradation due to channel modifications, etc.).
- b. Stream classification (Rosgen, 1994) (slope, sinuosity, entrenchment, width, depth, bed material) and stage of evolution (Schumm, 1984).
  - c. Waterway designation: Areas of special natural resource interest, outstanding resource waters (ORW) and exceptional resource waters (, ERW), trout stream classification, type (cold or warm water, fish habitat) and characteristics.
  - d. Stability of bank, stream lateral recession rates, bank height, bank angle, percent of bank protected by vegetation, rooting depth and density, presence of existing erosion control practices.
  - e. Tiers of vegetation – Aquatic, bank and upland. Presence of invasive species.
  - f. Number and orientation of existing or proposed decks, steps, piers, access points to water body, utilities, etc.
  - g. Documentation of cultural and historical resources.
  - h. Aquatic/terrestrial habitat and movement corridors for wildlife in a watershed context.
  - i. Site sketch, photographic documentation or checklist illustrating items V.B.2.a through h (including items V.B.1.a through f).

### C. Shoreline Site Assessment

A site assessment shall be conducted and incorporated into the design. The assessment shall be performed to determine the physical, cultural, and historical site characteristics that will influence the construction, maintenance, and environmental integrity of the protection. The site assessment shall include:

1. Determination whether the causes of instability are local (e.g., lake or overland actions, ice, seepage, sediment accumulation, littoral drift, etc.) or

watershed related (e.g., water level control structure, recreation, etc.).

2. Waterway designation (area of special natural resource interest, ORW, ERW) and size and type of water body (seepage lake, groundwater drainage lake, drainage lake, impoundment).
3. Water level fluctuation, *ordinary high water mark (OHWM)*, water depth at 20 feet and 100 feet from shore.
4. Shore orientation and geometry.
5. Bank recession rate.
6. Average fetch – Measured by the average of a central radial line, perpendicular to the shoreline, and two radials measured at 45 degree angles from the central radial.
7. Drainage paths, flow patterns, runoff controls, roof gutters, impervious areas.
8. Bank and bed composition and stability – Soil type, composition, Unified Soil Classification System (USCS) profile log, bank height, bank angle, percent of bank protected by vegetation, rooting depth and density, presence of existing erosion control practices.
9. Tiers of vegetation – Aquatic, littoral, bank, and upland. Presence of invasive species.
10. Identification of the size and location of areas or habitats requiring avoidance (e.g., wetlands, riparian and upland areas, near shore habitat).
11. Aquatic/terrestrial habitat and movement corridors for wildlife in a watershed context.
12. Length of treatment area and accessibility for equipment.
13. Location and size of access corridor.
14. Number and orientation of existing or proposed decks, steps, piers, access points to water body, utilities, etc.
15. Documentation of cultural and historical resources.

16. Site sketch illustrating items V.C.1 through V.C.15.

#### **D. General Design Criteria For Streambanks and Shorelines**

Several general criteria apply to this practice. They are as follows:

1. Since each reach of a channel, lake, or estuary is unique, measures for streambank and shoreline protection must be installed according to a plan and adapted to the specific site. Recommended design procedures are located in the EFH Chapters 3, 16, and 18.
2. Protective measures are to be consistent with management objectives and compatible with other improvements being planned or being carried out.
3. Protective measures shall be compatible with the bank or shoreline materials, water chemistry, channel or lake hydraulics, and slope characteristics both above and below the water line.
4. Protective measures shall be designed to avoid or minimize the potential for increased erosion to an adjacent reach of shoreline or streambank.
5. The impacts of boat-generated waves shall be accounted for in the design.
6. Minimum clearing shall be performed to accomplish the project. Existing vegetation shall be preserved as much as possible.
7. Protection measures shall start and end at a stabilized or controlled point.
8. Control of surface runoff and internal drainage shall be addressed in the design and installation of all protection measures.
9. All disturbed areas shall be protected from erosion during and after construction by implementing a site erosion control plan.
10. Excavated material shall not be placed in wetlands, water bodies, or other areas or habitats requiring avoidance, and shall be stabilized to prevent erosion.

11. Where livestock watering facilities are provided, design shall be as described for channel crossings in NRCS Wisconsin Field Office Technical Guide (FOTG), Section IV, Standard 560, Access Road.

12. Solid waste materials, such as construction debris, or tires, shall not be used for protection.

#### **13. Vegetative Treatments**

- a. Vegetation shall be selected that is best suited for the site conditions and intended purpose. The vegetation may need to tolerate frequent or long durations of inundation.
- b. Vegetation establishment shall be done in accordance with the conservation practice standards contained in the NRCS FOTG, Section IV.
- c. Existing stable *bank zones* may remain unshaped and treated with vegetation only.
- d. Bank zones to be treated only with vegetation that require shaping to be stable shall be sloped to a 2 horizontal to 1 vertical (2:1) side slope or flatter. Steeper slopes may be installed if a slope stability analysis can demonstrate adequate stability.
- e. Structural treatments shall be provided in the *toe zone*.

#### **14. Soil Bioengineering Treatments**

- a. Treatments shall follow the applicable "application and effectiveness" criteria found in EFH, Chapter 16, or other widely accepted references.
- b. Structural treatments shall be provided in the toe zone area.
- c. Installation shall be in accordance with NRCS specifications, or other widely accepted references.

#### **15. Structural Treatments**

- a. Structural treatments shall be selected and designed that are best suited for the site conditions and intended purpose.

- b. Riprap revetments or other sloped structural measure stabilization practices shall be sloped to a 1.5:1 vertical side slope or flatter.
  - c. Riprap revetments  $D_{50}$  shall be sized using EFH, Chapter 16, methods (e.g., wave heights for shore protection or velocities for stream bank protection).
  - d. Other structural treatments shall be designed to be stable for all anticipated load conditions. They shall, at a minimum, be designed and installed according to manufacturer's specification data.
  - e. Bulkheads shall be designed to be stable for all anticipated load conditions.
16. Other proposed methods or materials shall meet or exceed the level of protection expected from conventional practices. They shall, at a minimum, be designed and installed according to manufacturer's specification data.

#### E. Specific Streambank Design Criteria

Several streambank criteria apply to this standard. They are as follows:

- 1. The channel grade must be controlled, either by natural or artificial means, before any permanent type of bank protection can be determined feasible.
- 2. Treatment measures shall be constructed to at least the:
  - a. Minimum depth of the *anticipated bottom scour*.
  - b. Highest elevation of the following:
    - i One foot above base flow conditions.
    - ii To the height of seep lines in the bank, if not controlled in some other fashion.
    - iii Bankfull elevation.
- 3. Channel clearing to remove stumps, fallen trees, debris, and sediment bars shall only be performed when they are causing or could cause unacceptable bank erosion, flow restriction, or damage to structures. Habitat forming elements that provide cover, food, pools, and water turbulence shall be retained or replaced to the extent possible.
- 4. In-stream structural treatments installed to redirect flow away from eroding banks may be used. Measures shall be designed using EFH, Chapter 16, methods.
- 5. Significant alterations to channel alignment or channel geometry shall be made only after an evaluation using current fluvial geomorphologic techniques. Effects on the land use, interdependent water disposal systems, hydraulic characteristics, wetlands, and existing structures shall be investigated.
- 6. Treatment measures shall be stable for the minimum design flow based on what the treatment is protecting unless out-of-bank flow occurs at a lower stage. Minimum design flows shall be calculated using USGS Flood-Frequency Characteristics of Wisconsin Streams (formerly known as the Conger method), or NRCS applicable hydrology model (EFH, Chapter 2, TR-55, or TR-20). Minimum design flow return periods are:
  - 10 year – for cropland, woodland, pastureland, or other lands.
  - 25 year – for uninhabited structures, farm buildings, limited access roads and their appurtenances, parks, and other improved properties.
  - 100 year – for residences, businesses, state and local highways and their appurtenances, or other structures which if imperiled would threaten the life and safety of people.
- 7. Design criteria for livestock or equipment channel crossings shall be in accordance with NRCS FOTG, Section IV, Standard 578, Stream Crossing.
- 8. Fish habitat improvement or protection incorporated into streambank design shall be in accordance with NRCS FOTG, Section IV, Standard 395, Stream Habitat Improvement and Management. See EFH, Chapter 16, for further information.
- 9. The design elevations of treatment measures shall be referenced to the bankfull elevation.



## F. Specific Shoreline Design Criteria

Shoreline criteria are as follows:

1. Shoreline treatment measures shall be keyed as necessary to prevent anticipated bottom scour.
2. Treatment measures shall be provided to at least the highest elevation of the following:
  - a. OHWM plus the design storm wave height.
  - b. To the height of seep lines in the bank if not controlled in some other fashion.
  - c. The height of boat-generated waves.
3. Design elevations of treatment measures shall be referenced to the OHWM.
4. Temporary wave protection may be installed for the purpose of providing an area of quiescent water for the establishment of vegetative treatments. Maintain the temporary wave break until vegetation is well established, at which time the wave protection shall be removed.

## VI. Considerations

Additional recommendations relating to design that may enhance the use of, or avoid problems with, this practice but are not required to ensure its basic conservation functions are as follows.

- A. When protecting improvements such as utilities, roads, buildings, or other facilities, consideration should be given to items such as cost of stabilization compared to the value of the structure, the possibility of relocating the structure, the remaining service life of the structure, and the effect of the stabilization on the future management system of the landowner.
- B. Consideration should be given to maintaining and increasing native vegetation.
- C. When planning streambank and shoreline protection, consider the following water quality effects:
  - vegetation filtering the movement of sediment, absorbed sediment and dissolved substances;

- erosion and movement of sediment and sediment-attached substances carried by runoff and stream flow;
  - visual quality of on-site and downstream water resources;
  - construction and vegetation establishment;
  - changes in water temperatures; and
  - wetlands and water-related wildlife habitats for short and long-term periods.
- D. Artificial obstructions, such as fences or barriers, may be used to protect vegetation needed for streambank protection or to protect critical areas from damage by trail or vehicular traffic. Where needed, construct a permanent fence capable of excluding livestock from the streambanks. Refer to NRCS FOTG, Section IV, Standard 382, Fence. Floodgates may be used at channel crossings, property fence lines, and at other fence lines. Refer to EFH, Chapter 16, for an example of a floodgate.
  - E. Observe adjacent stabilization treatment measures and comparable sections of shoreline when available.
  - F. Stabilization practices using structural treatment measures are effective in the following situations:
    - sharp bends, at bridges where velocities are increased,
    - along the opposite bank where another stream junctions,
    - on large streams, and
    - on shorelines with slumping due to seepage.
  - G. Check for existing lake, stream, or watershed management plans and aim to make the protection project consistent with management objectives.

## VII. Plans and Specifications

Plans and specifications for streambank and shoreline protection shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

## VIII. Operation and Maintenance

An Operation and Maintenance Plan shall be developed with the landowner or operator that is consistent with the purposes of this practice, intended life of the components, and criteria for design.

## IX. References

Federal Interagency Stream Restoration Working Group (FISRWG) (15 Federal agencies of the US government). Stream Corridor Restoration Principles, Progress and Practices, GPO Item No. 0120-A; SuDocs No. A 57.6/2:EN3/PT.653. ISBN-0-934213-59-3. 2001.

[http://www.nrcs.usda.gov/portal/nrcs/detailfull/national/water/?cid=stelprb1043244technical/stream\\_restoration/newgra.html](http://www.nrcs.usda.gov/portal/nrcs/detailfull/national/water/?cid=stelprb1043244technical/stream_restoration/newgra.html).

Rosgen, David L., 1994. A Classification of Natural Rivers. Catena vol. 22. Elsevier Press.

Schumm, S.A., Harvey, M.D. and Watson, C.C. 1984. Incised Channels – Morphology, Dynamics and Control. Water Resources Publications.

USDA, NRCS, Wisconsin Field Office Technical Guide (FOTG), Section IV, Practice Standards and Specifications.

USDA, NRCS, National Engineering Handbook, Part 650, Engineering Field Handbook, and Wisconsin supplements.

USDA, NRCS, National Water and Climate Center. Stream Visual Protocol, Technical Note 99-1.

USDA, NRCS, Wisconsin Biology Technical Note WI-1, Shoreland Habitat.

Wisconsin Department of Natural Resources (WDNR). Includes ORW/ERW Designated Waters Search Link:

[http://dnr.wi.gov/topic/Surface Water/orwerw.html](http://dnr.wi.gov/topic/Surface%20Water/orwerw.html).

WDNR, Trout Stream Classifications. Information and maps:

[Http://dnr.wi.gov/topic/fishing/trout/streammaps.html](http://dnr.wi.gov/topic/fishing/trout/streammaps.html)

USDA, NRCS, Technical Release 55, Urban Hydrology for Small Watersheds.

USDA, NRCS, Technical Release 20, Computer Program for Project Formulation Hydrology.

## X. Definitions

*Access Corridor (V.A.2.)* – Typically a low growing vegetated strip of land that provides pedestrian access and a view of the waterfront.

*Anticipated Bottom Scour (V.E.2.a.)* – The depth necessary to maintain a stable foundation for the life of the practice as determined by accepted methodologies.

*Bankfull Elevation (V.B.1.b.)* – In Wisconsin, the bankfull elevation of channels is roughly the water elevation during the 1.2-year discharge. In many channels, this is the point where water begins to flow out onto its floodplain. Note: Since floodplains may be small or inconspicuous in some stream types where floodplains are naturally indistinct or presently being developed, it is important to verify correct identification of the bankfull surface by checking it against the 1.2-year discharge. This can be done using Manning's equation, USGS Flood-Frequency Characteristics of Wisconsin Streams (formerly known as the Conger method), TR20 or TR55, or from gauge data.

*Bank Zone (V.D.13.c.)* – The area above the toe zone located between the average water level and the bankfull elevation or OHWM. Vegetation may be herbaceous or woody, and is characterized by flexible stems and rhizomatous root systems.

*D<sub>50</sub> (V.D.15.c.)* – The size of material of which 50 percent of the material sample is smaller by weight.

*Littoral (V.A.2.)* – The near-shore shallow-water zone of a lake where aquatic plants grow.

*Ordinary High-Water Mark (OHWM) (V.C.3.)* – Ordinary high-water mark is the point on the shore up to which the presence and action of the water is so continuous as to leave a distinct mark by one of the following: erosion, destruction of terrestrial vegetation, or other easily recognized characteristics.

*Soil Bioengineering (III.)* – A system of living plant materials with a specified configuration installed as the primary means of soils stabilization. It also includes organic materials that are biodegradable such as shrubs and trees; live stakes and posts; non-treated wood; jute netting; fiber rolls and mats; logs; tree revetments; logs, root wads, dormant post; coir logs and branches in a specific configuration installed as a means of bank stabilization.

*Toe Zone (V.D.13.e.)* – The portion of the bank that is between the average water level and the bottom of the lakebed or channel, at the toe of the bank.

*Structural Treatments (III.)* – A system of non-living materials with a specific configuration installed as a means of (bank or shore) stabilization including, but not limited to, riprap, tree revetments, log/root wad/ boulder, dormant post, jacks, coir logs, bulkheads, and stream barbs.



**APPENDIX 12-2**

**STREAMBANK COST ESTIMATES**

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**PRELIMINARY COST ESTIMATE  
WATER QUALITY TRADE PROJECTS  
VILLAGE OF ELLSWORTH, WI**

**SITE 1 - BEKKUM & SPRINGETT**

**Sites 1N 0.04% Phos**

Quantity	Unit	Item	Unit Price	Total
1	L.S.	Mobilization	\$ 2,500.00	\$ 2,500.00
1	L.S.	Site Preparation, clearing, and grading	\$ 2,000.00	\$ 2,000.00
185	cu. yd.	Limestone rock riprap D50 size 8" Diameter	\$ 50.00	\$ 9,250.00
410	sq. yd.	Geotextile Fabric, Type SAS	\$ 3.00	\$ 1,230.00
310	sq. yd.	Liming, fertilizing, seeding and mulching	\$ 5.00	\$ 1,550.00
1	L.S.	Erosion Control	\$ 1,500.00	\$ 1,500.00
1	L.S.	Tracking Pad	\$ 1,200.00	\$ 1,200.00
<b>Subtotal</b>				<b>\$ 19,230.00</b>
Contingency (20%)			\$ 3,850.00	
<b>Total Estimated Construction Cost</b>				<b>\$ 23,080.00</b>

**SITE 2 - BEKKUM**

**Sites 2S 0.05% Phos**

Quantity	Unit	Item	Unit Price	Total
1	L.S.	Mobilization	\$ 2,500.00	\$ 2,500.00
1	L.S.	Site Preparation, clearing, and grading	\$ 1,800.00	\$ 1,800.00
150	cu. yd.	Limestone rock riprap D50 size 8" Diameter	\$ 50.00	\$ 7,500.00
330	sq. yd.	Geotextile Fabric, Type SAS	\$ 3.00	\$ 990.00
250	sq. yd.	Liming, fertilizing, seeding and mulching	\$ 5.00	\$ 1,250.00
1	L.S.	Erosion Control	\$ 1,250.00	\$ 1,250.00
2	EA	Tracking Pad	\$ 1,200.00	\$ 2,400.00
<b>Subtotal</b>				<b>\$ 17,690.00</b>
Contingency (20%)			\$ 3,540.00	
<b>Total Estimated Construction Cost</b>				<b>\$ 21,230.00</b>

**SITE 3 - BEKKUM**

**Sites 3S 0.05% Phos**

Quantity	Unit	Item	Unit Price	Total
1	L.S.	Mobilization	\$ 2,500.00	\$ 2,500.00
1	L.S.	Site Preparation, clearing, and grading	\$ 1,800.00	\$ 1,800.00
210	cu. yd.	Limestone rock riprap D50 size 8" Diameter	\$ 50.00	\$ 10,500.00
440	sq. yd.	Geotextile Fabric, Type SAS	\$ 3.00	\$ 1,320.00
260	sq. yd.	Liming, fertilizing, seeding and mulching	\$ 5.00	\$ 1,300.00
1	L.S.	Erosion Control	\$ 1,250.00	\$ 1,250.00
1	L.S.	Tracking Pad	\$ 1,200.00	\$ 1,200.00
<b>Subtotal</b>				<b>\$ 19,870.00</b>
Contingency (20%)			\$ 3,970.00	
<b>Total Estimated Construction Cost</b>				<b>\$ 23,840.00</b>

**SITE 4 - BEKKUM & SPRINGETT****Sites 4N 0.05% Phos**

Quantity	Unit	Item	Unit Price	Total
1	L.S.	Mobilization	\$ 2,500.00	\$ 2,500.00
1	L.S.	Site Preparation, clearing, and grading	\$ 2,000.00	\$ 2,000.00
560	cu. yd.	Limestone rock riprap D50 size 8" Diameter	\$ 50.00	\$ 28,000.00
1,260	sq. yd.	Geotextile Fabric, Type SAS	\$ 3.00	\$ 3,780.00
400	sq. yd.	Liming, fertilizing, seeding and mulching	\$ 5.00	\$ 2,000.00
1	L.S.	Erosion Control	\$ 1,500.00	\$ 1,500.00
1	L.S.	Tracking Pad	\$ 1,200.00	\$ 1,200.00
<b>Subtotal</b>				<b>\$ 40,980.00</b>
Contingency (20%)			\$ 8,200.00	
<b>Total Estimated Construction Cost</b>				<b>\$ 49,180.00</b>

**SITE 5 - BEKKUM****Sites 5N 0.07% Phos**

Quantity	Unit	Item	Unit Price	Total
1	L.S.	Mobilization	\$ 2,500.00	\$ 2,500.00
1	L.S.	Site Preparation, clearing, and grading	\$ 2,000.00	\$ 2,000.00
320	cu. yd.	Limestone rock riprap D50 size 8" Diameter	\$ 50.00	\$ 16,000.00
715	sq. yd.	Geotextile Fabric, Type SAS	\$ 3.00	\$ 2,150.00
460	sq. yd.	Liming, fertilizing, seeding and mulching	\$ 5.00	\$ 2,300.00
1	L.S.	Erosion Control	\$ 1,500.00	\$ 1,500.00
1	L.S.	Tracking Pad	\$ 1,200.00	\$ 1,200.00
<b>Subtotal</b>				<b>\$ 27,650.00</b>
Contingency (20%)			\$ 5,530.00	
<b>Total Estimated Construction Cost</b>				<b>\$ 33,180.00</b>

**SITE 6 - BEKKUM****Sites 6S 0.06% Phos**

Quantity	Unit	Item	Unit Price	Total
1	L.S.	Mobilization	\$ 2,500.00	\$ 2,500.00
1	L.S.	Site Preparation, clearing, and grading	\$ 2,500.00	\$ 2,500.00
250	cu. yd.	Limestone rock riprap D50 size 8" Diameter	\$ 50.00	\$ 12,500.00
560	sq. yd.	Geotextile Fabric, Type SAS	\$ 3.00	\$ 1,680.00
500	sq. yd.	Liming, fertilizing, seeding and mulching	\$ 5.00	\$ 2,500.00
1	L.S.	Erosion Control	\$ 1,800.00	\$ 1,800.00
1	L.S.	Tracking Pad	\$ 1,200.00	\$ 1,200.00
<b>Subtotal</b>				<b>\$ 24,680.00</b>
Contingency (20%)			\$ 4,940.00	
<b>Total Estimated Construction Cost</b>				<b>\$ 29,620.00</b>



**SITE 7 - BEKKUM****Sites 7N 0.05% Phos**

Quantity	Unit	Item	Unit Price	Total
1	L.S.	Mobilization	\$ 2,500.00	\$ 2,500.00
1	L.S.	Site Preparation, clearing, and grading	\$ 2,500.00	\$ 2,500.00
285	cu. yd.	Limestone rock riprap D50 size 8" Diameter	\$ 50.00	\$ 14,250.00
640	sq. yd.	Geotextile Fabric, Type SAS	\$ 3.00	\$ 1,920.00
570	sq. yd.	Liming, fertilizing, seeding and mulching	\$ 5.00	\$ 2,850.00
1	L.S.	Erosion Control	\$ 2,000.00	\$ 2,000.00
1	L.S.	Tracking Pad	\$ 1,200.00	\$ 1,200.00
<b>Subtotal</b>				<b>\$ 27,220.00</b>
Contingency (20%)			\$ 5,440.00	
<b>Total Estimated Construction Cost</b>				<b>\$ 32,660.00</b>

**SITE 8 - BEKKUM****Sites 8S 0.05% Phos**

Quantity	Unit	Item	Unit Price	Total
1	L.S.	Mobilization	\$ 2,500.00	\$ 2,500.00
1	L.S.	Site Preparation, clearing, and grading	\$ 2,500.00	\$ 2,500.00
230	cu. yd.	Limestone rock riprap D50 size 8" Diameter	\$ 50.00	\$ 11,500.00
520	sq. yd.	Geotextile Fabric, Type SAS	\$ 3.00	\$ 1,560.00
580	sq. yd.	Liming, fertilizing, seeding and mulching	\$ 5.00	\$ 2,900.00
1	L.S.	Erosion Control	\$ 2,000.00	\$ 2,000.00
1	L.S.	Tracking Pad	\$ 1,200.00	\$ 1,200.00
<b>Subtotal</b>				<b>\$ 24,160.00</b>
Contingency (20%)			\$ 4,830.00	
<b>Total Estimated Construction Cost</b>				<b>\$ 28,990.00</b>

Total Construction Cost	<b>\$ 201,480.00</b>
Engineering, Legal, Agreements, Admin, Permits	\$ 40,300.00
<b>Total Project Cost</b>	<b>\$ 282,100.00</b>